

BROOKLYN BOTANIC GARDEN

PLANTS
&
GARDENS



PLANTING AND TRANSPLANTING

A HANDBOOK

DECIDUOUS AND EVERGREEN TREES AND SHRUBS
FRUIT TREES, HERBACEOUS PERENNIALS
SOIL CONDITION AND ACIDITY

Best Times and Techniques
Watering, Mulching, Winter Protection
Regional Considerations



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Connie Messina

PLANTS & GARDENS

BROOKLYN BOTANIC GARDEN RECORD

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PLANTING AND TRANSPLANTING

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Staking a tree includes using stout stakes, rubber hose-covered wire, a little slack for controlled sway to encourage rooting, and cloth wrap to protect the trunk (all removed a year later). Unlike here, spread the wires along the trunk so it won't snap off in a stiff wind. (See p. 42 for more about staking techniques.)

LETTER FROM THE BROOKLYN BOTANIC GARDEN

The origins of this Handbook go back several years, when Guest Editor James Cross discussed with BBG staff the desirability of more information for the home gardener on autumn planting. He and a number of other Long Island nurserymen have long felt that the gardener confines himself to a horticultural straitjacket by planting trees and shrubs only in a brief, rather frenzied, period in spring. The nurserymen's interest in extending the seasons is clear, but the practice of "off-season" planting happens to make a lot of sense for the gardener, too, unless he lives in one of the coldest parts of the country. Time is often more available in fall, and plants frequently perform better if they have a chance to settle in before great demands are made of their root systems.

The transition in the nursery trade from strictly bare-rooted or balled-and-burlapped trees and shrubs to container-grown ones has changed the traditional planting times, too. There is now a great latitude in seasons to set plants out, for ones from containers adapt very quickly in the soil because there is little root disturbance. It is a revolution of sorts, but the home gardener doesn't find much written information on the subject, at least under one cover. Nor for that matter is the specific subject of planting techniques dealt with very often. In addition, different plants have different requirements, and the varied geography of the country makes special planting considerations necessary. Thank you, Mr. Cross and Contributors, for bringing us up-to-date on planting.

Guest Editor Cross has chosen a fairly narrow approach to the subject because of his desire to home in on an area that is often treated too loosely or with muck-and-mysticism fervor. There is a tendency today on the part of the garden reporter, writing with little actual horticultural experience for the mass-market publications, to give a great many fixed rules of do's and don'ts. There are indeed a few rules, but there is often more than one way (and one season) to do something. A close reading of this Handbook will suggest many ideas for expanding the planting opportunities.

A good deal of ultimate planting success has not so much to do with technique or timing as with the kinds of plants you select. Plant selection is slightly out of the scope of this Handbook, but it is important. Before any substantial planting it makes sense to find out about a tree's or shrub's requirements, as well as its ultimate dimensions, adaptability and pest resistance. A good landscape designer can be of invaluable assistance, as can a local nurseryman. Do not be afraid to ask questions, for you are the one who will be living with these plants day after day. Also remember that there are some sixty soft-cover manuals like this one in the BBG series to turn to for assistance.

Happy planting. Spring, summer or autumn.

Sincerely,

Frederick Mc Gourty

Editor



Japanese flowering cherry (*Prunus serrulata*), often shipped bare-root

Sometimes the difference between success and failure . . .

THE BEST TIME TO PLANT ORNAMENTALS

James Cross

Since all gardeners are (secondly) human beings and subject to the flaws, temptations and weaknesses of this classification, the prevailing planting practices tend to be bent a great deal toward the mood and preference of the gardener. Frequently the gardener's preferences do not coincide with the plant's preferences! This is particularly true in regard to the time of year chosen for planting.

The most immediate concern in planting an ornamental in one's garden is to get that plant *established* as soon as possible. This means getting the roots out into the surrounding soil so that the plant is well anchored against the efforts of wind and/or frost and able to draw moisture from a larger soil area than that in the relatively small root ball at the time of planting. The objective is to get the plant in a better con-

dition to withstand whatever is coming in the way of an extended period of drought, heat or below-freezing temperatures.

In achieving this objective, there are a number of ways to help the natural process along. Those involving proper soil preparation (tempting those roots to reach out), proper plant preparation (helping assure that they can and will reach out) and proper after-care (timely watering) are covered in separate articles in this Handbook. You can also speed this process by doing most of your planting at those times of the year most favorable to the growth of roots. This will vary according to the climate in your given region but, even in those parts of the country with the mildest weather, some seasons are better for planting than others.

Guidelines for Planting

A few general rules which apply in almost every region of this country are:

1. Try to plant at least 4-6 weeks ahead of expected periods of unusual stress due to heat, drought or extreme cold.

2. Undertake new planting when soil temperatures are going to be cool (root growth is still active down to 40°F) and avoid planting in soils which are hot (root growth drops off rapidly above 90°F).

3. Undertake new plantings when top growth (flowers and foliage) has slowed down or, preferably, stopped, and thus the plant's resources can be directed toward root growth.

For those portions of the country with major seasonal swings, these rules translate into two most advantageous times for planting from the plant's point of view:

1. Late winter-very early spring, as soon as the soil is workable and as many weeks as possible prior to the major new growth of branches and leaves.

2. Late summer-fall, beginning as soon as summer's peak heat has begun to ease and the season's top growth is almost complete, and extending until 2-3 weeks before soil temperatures drop below 40°F (usually the first week of December in New York City).

More often than not the psychology of the gardener decides the actual planting times. These generally turn out to be later in both spring and fall than would be ideal for the plant. Who among us has been able to resist planting in the midst of the great burst

of new growth that is spring? Or, for that matter, how many find it easy to leave summer's hammock for an early return to serious gardening chores?

Geographic Considerations

It is difficult to break the country into separate regions, for there are no dividing lines appropriate for specific recommendations for the best times to plant. Recognizing that within each region there are numerous sub-regions whose climates vary appreciably, the following can be used as a rough guide for those areas containing the greatest concentrations of the gardening population. It should also be noted that the best times listed are just that. One can plant with good results at other times as long as good planting and after-care procedures are followed.

Northeast Coast (Boston to Philadelphia)

Main considerations: one-to-two month drought in summer and killing cold temperatures and frost-heaving during winter

Best times to plant:

Bare-rooted plants—April-early May (some years)

Broadleaf evergreens—Spring-early May and September

Needled evergreens—April-May and mid-September to early November

Lawns (seeded)—late August, September

Perennials—April-May and September to mid-November

New England (inland)

Main considerations: as with Northeast Coast (above)

Best times to plant:

Bare-rooted plants—mid-April through May

Broadleaf evergreens—April-May, late August-September

Needled evergreens—April-May, September-October

Lawns (seeded)—late August, September

Perennials—April-May, September

Middle Atlantic (coastal)

Main considerations: early summer heat, drought and winter cold

Best times to plant:

Bare-rooted plants—March-April



Roots spread out in, not forced into, the hole. Arrow points to desired ground level after planting.

Broadleaf evergreens—spring and late August–September

Needled evergreens—spring and September–November

Lawns (seeded)—late August to mid-September

Perennials—October–November

Southeast

Main considerations: summer heat; can have brief but severe cold in December and January

Best times to plant:

Bare-rooted plants—November and February

Broadleaf evergreens—September–November and February–March

Needled evergreens—anytime but summer

Lawns—October

Perennials—October–November and February–March

Midwest

Main considerations: winter cold and heaving, especially on clay soils

Best times to plant:

Bare-rooted plants—May

Broadleaf evergreens—May, September to mid-October

Needled evergreens—late April–May, September to mid-November

Lawns (seeded)—late August–September

Perennials—April–May, late summer–early fall

Plains States

Main considerations: summer wind and heat; winter cold

Best times to plant:

Bare-rooted plants—late March–April

Broadleaf evergreens—early spring–May

Needled evergreens—spring, September to mid-October

Lawns (seeded)—September to mid-October

Perennials—early spring, September to mid-October

Central (eastern slope of Rocky Mountains)

Main considerations: summer drought, winter cold

Best times to plant:

Bare-rooted plants—April to mid-May

Broadleaf evergreens—generally not planted

Needled evergreens—March to mid-June and September–October

Lawns (seeded)—mid-April to mid-June and September

Perennials—early spring

Pacific Northwest (coastal)

Main considerations: long summer drought—mid-May to mid-September; winter—December–February

Best times to plant:

Bare-rooted plants—from fall to late March

Broadleaf evergreens—October–November and March–April

Needled evergreens—late winter and early spring

Lawns (seeded)—September and March

Perennials—fall and March

California—Bay Area

Main considerations: summer heat and drought (May–October)

Best times to plant:

Bare-rooted plants—December through February

Broadleaf evergreens—October through March

Needled evergreens—anytime; fall, winter or spring

Lawns (seeded)—mid-September–October and March

Perennials—fall and spring

California—Southern

Main considerations: in inland areas, heat

and drought in late spring and summer
Best times to plant: (generally no bad time along coast)

Bare-rooted plants—(typically dormant fruit trees) late December–January

Broadleaf evergreens—winter, spring

Needled evergreens—winter, spring

Subtropical plants—April, May

Lawns (seeded)—October through winter

Drought-tolerant native plants—October–November

California—Central Valley

Main considerations: heat of late spring and summer

Best times to plant:

Bare-rooted plants—late December to March

Broadleaf evergreens—October through winter

Needled evergreens—October through winter

Lawns (seeded)—mid-September through winter

Perennials—late summer–fall and early spring

Drought-tolerant native plants—when plants are dormant

Southwest (southernmost inland states)

Main considerations: summer heat and drought

Best times to plant: (generally few limitations other than avoiding summer)

Bare-rooted plants—January to mid-February

Broadleaf evergreens—(few other than citrus) late August–October and March–April

Needled evergreens—almost anytime except late spring and summer

Lawns (seeded) Bermuda grass—April–May; winter rye—late October–November

Perennials—infrequently used

Special Considerations

For those areas with extended periods of below-freezing winter temperatures, the following plants should be handled with especially careful procedures or avoided completely in fall plantings *if* they have to be dug fresh from the earth. (The degree of risk will vary from area to area.)

Acer rubrum (red maple)



Star magnolia (*Magnolia stellata*), left, and flowering dogwood (*Cornus florida*), below, should only be dug and moved with caution in the autumn in the colder northern states.





In colder climates American holly (*Ilex opaca*) needs time to establish roots before the onset of harsh weather. In the warmer areas, however, winter planting prepares the plant for the extreme heat of summer.

Betula (birch)
Carpinus (hornbeam)
Chamaecyparis nootkatensis (nootka false-cypress)
Cornus florida (flowering dogwood)
Crataegus (hawthorn)
Koelreuteria paniculata (goldenrain-tree)
Liriodendron tulipifera (tulip-tree)
Liquidambar styraciflua (sweet-gum)
Magnolia (magnolia)
Nyssa sylvatica (sour-gum)
Prunus species (peach, cherry, other stone fruits)
Pyrus calleryana (callery pear)
Quercus (oaks—white, scarlet, burr, willow, English and red)
Salix babylonica (weeping willow)
Tilia tomentosa (silver linden)
Zelkova serrata (zelkova)

In the same type of climate, late summer—

early fall planting is preferred and *late* fall planting is to be avoided for:
Berberis julianae (barberry, evergreen types)
Cotoneaster salicifolius (willowleaf cotoneaster)
Hedera helix (English ivy)
Ilex aquifolium (English holly)
Ilex crenata (Japanese holly)
Ilex opaca (American holly)
Pinus nigra (Austrian pine)
Pinus sylvestris (Scots pine)
Pinus thunbergiana (Japanese black pine)
Rhododendron (all types of hardy rhododendron and azalea)
Taxus baccata 'Repandens' (weeping English yew)
Tsuga canadensis (Canadian hemlock)
Viburnum rhytidophyllum (leatherleaf viburnum) ❧

PREPARING TRANSPLANTS FOR PLANTING

Hal Bruce

What we see when we look at a plant is only half of it; stem, branches, leaves, flowers, fruits—an elaborate system of organs growing above the ground. Invisible to our eyes, growing underground, is an equally elaborate and extensive system of roots which is just as necessary to the plant's survival. These roots may extend into the soil to a distance greater than the plant is tall, and spread beneath the surface to an extent many times greater than the plant is broad.

When a plant is dug, a large portion of this root system is cut off and left in the ground. The transplant suffers a trauma equal to that of a human being in major surgery. As a postoperative human patient must go through a period of intensive care before functioning normally again, so must a recently transplanted plant receive intensive care, or else it will die.

The principles behind successfully transplanting any plant are relatively simple if we keep in mind the main functions of roots. First, they keep the cells of leaves and other above-ground parts filled with water (in which are dissolved nutrients) pulled from the ground; second, they serve as an anchor which prevents the above-ground plant from toppling over in the wind. Cut and damaged roots perform neither of these functions well. The intensive care which must be provided for transplants therefore consists first of assisting the damaged roots to perform their primary functions, and second to provide the best possible environment for quick regeneration and replacement of missing roots. In plainer words, we must never allow the roots of the transplant to dry out while it is out of the ground, we must water it frequently, deeply and for a long period of time after it is placed in its new location, we must prune its top to bring the ratio of top to root growth back in balance, and, unless it is so short that it offers no resistance to wind, we must stake it until it regenerates anchoring roots.

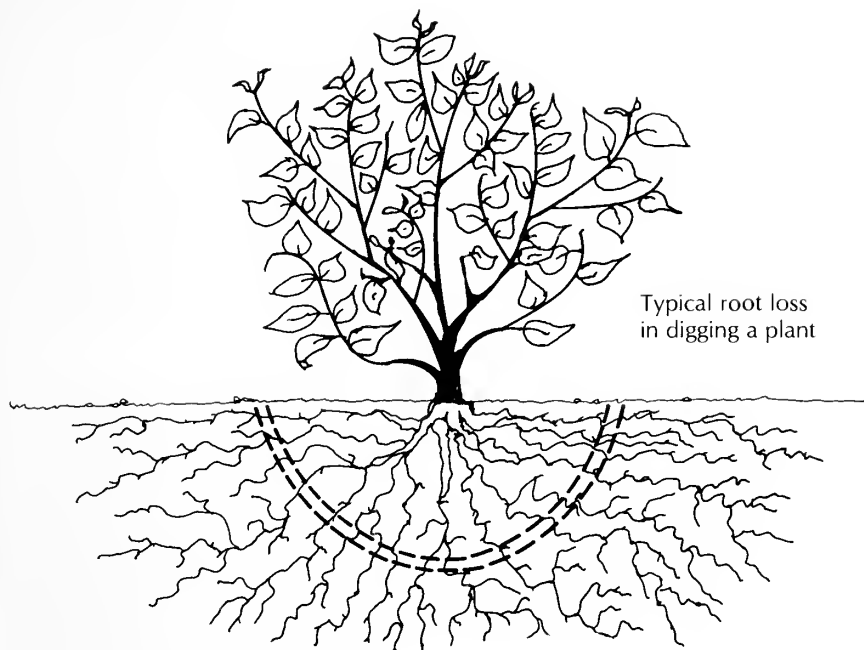
Some Examples

These principles are simple enough, but applying them to specific situations is complicated by the very diversity of plant life. The season of the year, the soil and location you plant in, will influence the frequency of watering. Whether the plant is upright or spreading, a tree, a shrub, or herbaceous will influence the sort of pruning you must do. The size of the plant, or whether it is deciduous or evergreen, will often make a great deal of difference in the condition of the plant when you receive it—for instance, whether the plant comes with or without soil on its roots.

By way of example I cite two trees presently growing on my property which I moved from my former home two autumns ago. One, an eight-foot Japanese dogwood, was dormant at the time. I cut off all its side branches, since I wanted to train it to tree form, dug a trench on a two-foot radius all around the plant, pried it out of the ground, quickly snipped off bruised and broken root ends with sharp shears, shook off most of the soil, gave the roots a brief, fine spray with a garden hose, wrapped them in a plastic trash bag, lifted the plant to my shoulder and walked away. The whole operation took about fifteen minutes.

The second plant, a six-foot Oriental spruce, was carefully dug with a large ball of soil which was wrapped in burlap and secured with twine. Two men were required to haul it away in a rented truck. The operation took half a day.

The plants were treated differently because one was deciduous and the other evergreen. The evergreen spruce would probably have died had I shaken the soil from its roots as I did with the deciduous, dormant dogwood, because evergreens never become truly dormant. In any case, the formal structure of the tree prohibited the kind of extreme pruning given to the dogwood,



which if applied to the spruce would have mutilated it forever. Thus, moving the spruce involved much more labor and expense. The huge ball of soil *did* help to anchor the spruce against winter winds while the dogwood had to be staked very carefully. Both required careful and frequent watering immediately and throughout the following season. The spruce very shortly looked as though it had been growing in location from the beginning. Even two years later, the dogwood, however, has a crown spread of only about three feet and still looks like a transplant. A long period of recuperation results when one handles plants in as extreme a fashion as this was handled.

We can classify transplants into three classes according to the way they are dug and/or shipped: bare-rooted plants, balled-and-burlapped plants, and container-grown plants. The balance of this article will consider each of these three classes in some detail and attempt to show how the class modifies the principles of transplanting outlined earlier.

Bare-rooted Plants

These have had the soil washed or shaken from their roots after digging. Nearly all are deciduous trees or shrubs (or herbaceous perennials) which are dormant. Most mail-order plants, at least those in larger sizes, are of this class because plants in soil are too heavy to ship economically. A good many tap-rooted plants, such as nut trees, persimmons, some fruit and shade trees, are handled this way because they are not amenable to baling and burlapping. Plants which one finds at nurseries and garden marts in early spring (grape vines, tree peonies, "bargain" collections of common shrubs like privet, weigela or forsythia) with roots wrapped in damp sphagnum or excelsior and packaged in colorful cardboard or waxed-paper containers, are also bare-rooted plants. These need special attention, because their roots are tightly bunched up in unnatural positions in order to force them into the package. Discard the wrapping of sphagnum or other material when



Left, a single-trunked, bare-root tree before (a) and after (b) top-pruning it into a whip. Right, a bare-root shrub as planted (a) and after removing weaker stems to the crown and cutting back the remainder (b).

you plant them, and spread the roots outward and downward as they grow naturally.

Planting season for this class is when the plants are dormant, or nearly so, from about October to April. Fall is generally preferable in the South and very early spring in the North.

Conditioning of roots: Never let the roots dry out. This is perhaps the single most important source of failure with this class. Soak packaged plants overnight in a container of water large enough to cover all the roots, and plant the next day if possible. At the planting site, keep the roots in water or wrapped in plastic or wet paper until the actual moment you place the plant in the hole and cover the roots with soil. Water the plant immediately. An old technique which works especially with bare-rooted plants is to make a "slurry" (a soupy mixture of fine silt or clay soil and water) and dip the roots in this. The slurry covers all the fine root hairs which ordinarily dry out first, keeps them moist before planting and helps to eliminate tiny but damaging pockets of air among the fine roots after planting. Whether you use a slurry or not, quickly go over the root system for bruised, broken or otherwise damaged roots and cut cleanly just above the damaged part with a pair of sharp shears.

Top pruning: Prune severely. The more top growth you take out, the more quickly the plant will establish itself. For single-trunked trees, "whip" the transplant by cut-

ting off all side branches flush with the trunk. For multi-stemmed plants, take all weak or unwanted stems back to the crown, and cut the rest back about halfway.

Balled-and-Burlapped Plants

These are likely to have been grown in nursery rows for some time and to have been root-pruned so that the root system within the balls is compact and fibrous. Such plants re-establish themselves rapidly. In this classification or the next one fall those plants which never become dormant, thus are not amenable to bare-root treatment: broad-leaf evergreens like rhododendrons and azaleas, conifers of all types, including the spruces and pines sold as living Christmas trees in December, and a number of deciduous shrubs and trees which have branching root systems which are easily contained in a soil ball. Plants collected from the wild are sometimes sold by native-plant nurseries in this condition but are unlikely to have as compact a root system as nursery-grown plants and may require severe cutting back to compensate for root loss.

Planting season: Almost any time of the year that the ground can be worked, though spring and fall are best. Plants put in during summer need special attention, including watering frequently and deeply during the first year.

Conditioning of roots: Since these are contained in the ball of soil, they need no special care. Make sure, though, that the

ball never dries out, either before it is in the ground or afterwards. Since a soil ball full of water is extremely heavy, as well as prone to breaking, soak it and let it drain. Don't soak it just before you decide to put the plant in.

Top pruning: You usually will not need to prune these as severely as bare-rooted plants, but, as with all classes, the more top pruning done, the more quickly the plant re-establishes itself. The time of transplanting is an excellent time to do any corrective pruning by taking out weak, crossing or unwanted branches.

Container-grown Plants

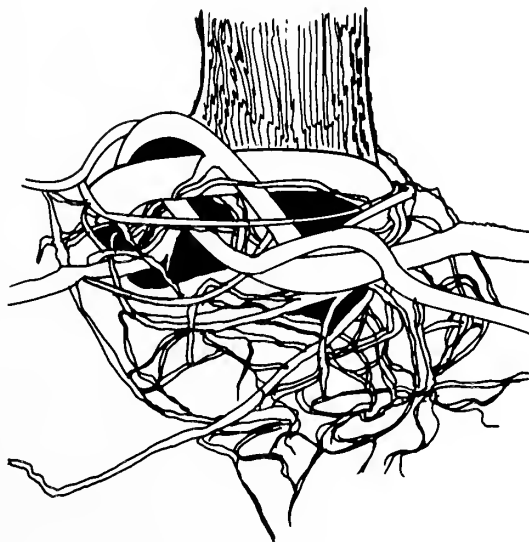
These are becoming more and more popular in the nursery trade. They look good, and their roots suffer no damage in moving. Because of their appearance, gardeners are often misled into thinking that all they have to do is plunk these plants into the ground and forget about them. Nothing could be further from the truth.

Planting season: Any time of the year, but nearly the same strictures apply as for balled-and-burlapped plants.

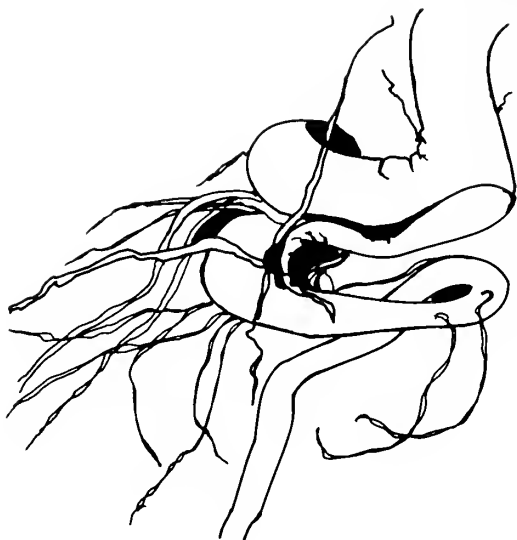
Conditioning of roots: Here is where most failures with container-grown plants occur, for such plants have what may be called a "container habit." They are accustomed to being contained in a limited space, to being watered often and abundantly;

their roots, like those of any potted plant, are coiled around one another in the container and may fill it tightly. Some of the larger roots may have become coiled back around the trunk and begun a process called root strangulation, which will in time kill the plant. Finally, the medium in which they are potted is usually so lightweight and porous that the plant, when put in the heavier soil of the home garden, is reluctant to send its roots into the soil. Instead, they keep coiling around within the originally contained area, as though the heavier soil functioned as a pot. As long as the plant is watered it thrives, but come summer drought or winter freeze, when the ground dries out to a level below the bottom of the original container or freezes to that line, the plant dies. All this time the unsuspecting owner thought the plant was putting down the deep roots that are a plant's best insurance against drought and cold, but the plant thought it was still growing in a plastic pot.

The solution to container habit is to pay special attention both to the soil you put in the hole and to the roots of the container-grown plant. Make a mix with plenty of aerating material—humus, peat, perlite, vermiculite, sand. Mix this with garden soil, perhaps in a half-and-half proportion, and use it in the extra-large hole you dig for the plant. The mix will create a transition zone between the medium in which the plant



In container-grown plants the larger roots may wind about the trunk, eventually girdling and strangling the plant. If this is the case, remove before planting.

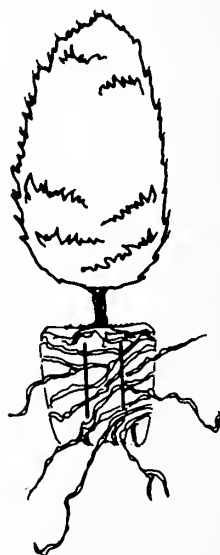
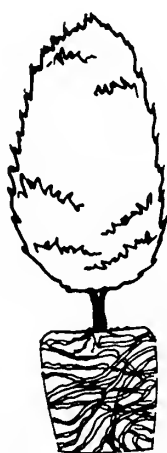


Another possible problem for container-grown plants is a jammed tap root. When planting, try to straighten as much as it will allow, or return to seller if too severe.

grows and your own soil. The heavier your soil, the more important is this step.

Next, remove the plant from the container. You are going to have to inflict some damage on that nice, tight root system in order to induce new roots to form and to pull some of the longer, tougher roots out of the ball. I take a sharp knife and make

about four longitudinal cuts about an inch deep and almost the length of the ball, spaced about evenly all around it. Then I take a sturdy screwdriver and pry behind some of the larger roots to pull them away from the ball. Any roots cut off in the process are discarded. The result looks much less tidy than it formerly did, but the plant



After the plant is knocked out of the container, tease some of the roots out of the ball to encourage their growth and adaptation in the medium of the prepared hole.

will be stimulated to grow new roots where old ones have been severed, and the long roots straggling out of the ball can be pulled into the surrounding soil when planting.

At this time also look carefully at the surface roots where they leave the trunk, and cut off flush with the trunk any that are growing up and over other roots or coiling around the trunk. You may find that after you have mutilated the root ball, some of the soil will fall out of its center. This is perfectly all right; simply make sure that you pack some of your own mixed soil into the cavity when you put the plant into the ground. Never leave air pockets around roots. Do all this as quickly as possible to avoid the drying out of the roots. When you plant, make sure that the long roots that you have uncoiled from the ball are not coiled back in place as though they were back in the container but, instead, are reaching downwards and outwards into the surrounding soil. The secret of this step is not,

of course, to cut off most of the roots or even to uncoil all of them, but to do just enough to shock the plant out of its container habit.

Top pruning: As with all transplants, prune as much as possible. This will vary with season and with specimen. If the season is early spring, then one might prune less severely than in June, because summer drought is not so imminent. A specimen with lots of top growth should be pruned more severely than one that is lower or more sparse. Plants with mounded habits, like 'Helleri' Japanese holly, dwarf box, 'Gumpo' azaleas or dwarf junipers might be cut back or sheared, while plants with taller, more open habits, like tea viburnum, Exbury azaleas, mock-orange and more common garden shrubs might be thinned by removal of thin weak branches. Keep container-grown plants frequently watered for a whole season after planting, and they should re-establish with no problems. ♣

A Matter of Position

Position is everything in life, saith our good friend Brunnera Gildermeister, social columnist for the *Daily Chronicle*. Yes, quite. She was of course referring to fruit trees. Have you ever noticed that the old apple orchards that you see in bloom in spring are located toward the tops of the hills and seldom in the valleys? Air drains much like water, the colder air being heavier than warm air, and the former settles in the valleys. Placed on the side of a hill, an orchard often thus misses the "last" frost of spring, which in many parts of the North occurs about the time fruit trees begin to open their tender, frost-susceptible buds. Similarly the "first" frost of autumn is avoided, which is nice especially if the tomatoes are still green. Even in Connecticut, a balmy state by New England standards, there are some valleys which receive a frost nearly every month of the year, while the immediately surrounding hills may go for five months without one. Zone maps, which are useful in broad terms, can't take this into account, and there are more caveats to them than Caesar had legions.

Height makes a difference for petunias and other tender annuals in the home garden, too. It helps to remember that there is often as much as a Fahrenheit degree of difference for each foot of elevation near the ground. Plants in containers elevated just two or three feet may escape the "first" frost of autumn while ones of the same kind planted in the ground may succumb.

Position can be a fine art. Crocosmias, gladioli, tigridias and other half-hardy bulbs frequently can be wintered over in the North if they are planted next to the south side of a house. For an English or American evergreen holly, requirements for ideal site are a little special, since these trees benefit from winter shade in the North, yet should have sun in summer. Their best placement is north of the house but not immediately adjacent to it—to take advantage of different angles of the sun at different seasons. ♣

F. McG.



Roche

Final step in balling and burlapping

For both woody and nonwoody plants...

THE ART OF TRANSPLANTING

William Flemer, III

Learning how to transplant herbaceous plants, shrubs and small trees successfully is one of the most important and valuable of gardening skills. Not only is it a rewarding

and deeply satisfying accomplishment, but it can save large sums of money by relocating valuable specimen plants before they become overcrowded and spoiled in the

home landscape. For example, it is almost unavoidable to set out new trees and shrubs too closely in a new garden and foundation planting. The average home looks so big and at the same time so bleak on its bare lot, and young trees and shrubs in the garden center look so small, that over-planting is sure to occur, especially in the foundation plantings. For a while, severe trimming can keep the expanding plants from crowding, but inevitably they become large enough to touch and then begin to crowd each other. Before they are spoiled, judicious transplanting to other locations in the garden can not only save increasingly valuable plants but also realize long-term landscape objectives and plans.

Similarly, hedge plants, especially evergreens like hemlocks and yews, tend to be planted too closely together in an effort to obtain immediate screening, and excessively crowded hedge plants compete aggressively and many do not long survive. If closely-set hedge plants can be transplanted and thinned out before they become slab-sided and disfigured, the ones which remain will be much more effective and long lived, while the ones which are moved can provide valuable extra screening for other parts of the home grounds.

Balling and Burlapping

Sizeable shade or flowering trees, and almost all evergreens, broadleafed or needled, are most easily and successfully transplanted with an undisturbed ball of the earth in which they were growing surrounding the roots. In traditional nursery practice, this ball is wrapped in burlap and then secured by a network of criss-crossing ropes. Burlap

is usually used for wrapping, not because of any inherent magical properties, but because it is both strong and inexpensive. When plants are to be transplanted in the home grounds, any covering ranging from old sheets to plastic netting can be used, or even just an abundant network of strong cord or rope may serve the purpose. The only requirement is that it prevent the ball of earth from breaking or shattering during the brief transplanting operation. In home transplanting the plant usually will not need to be man-handled on and off vehicles, or stored for a time above ground as in a garden center, so perfect wrapping is not necessary.

Obviously there is a limit to the size of plant which the home gardener can transplant unaided in his own yard, and weight is the limiting factor. A ball of earth 12" x 12" weighs only 45 lbs. A ball 18" across and 12" deep weighs 150 lbs., and one 24" across and 18" deep weighs 300 lbs. By using plank skids and rollers or a dolly, a gardening couple can move a ball of earth up to 30" in diameter, but beyond this size some sort of mechanical equipment becomes a necessity.

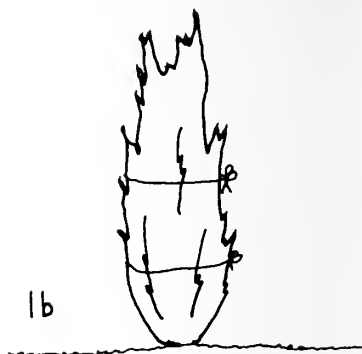
A beautifully shaped and wrapped ball of earth looks like a difficult thing to create, but really it is absurdly easy to do. Obviously, the size of the ball must be in some relation to the size of the shrub or tree to be moved. Although there are exceptions for some plants, the following chart is the one in general use in the nursery profession to determine the size of ball required by each size of plant.

In general, the depth of a ball of earth should be at least two-thirds its diameter. Thus an 18" wide ball of earth should be at least 12" deep, and so forth.

Height of Plant	Diameter of Ball	Weight of Ball
18 to 24 in.	10"	30 lbs.
2 to 3 ft.	12"	45 lbs.
3 to 4 ft.	13"	60 lbs.
4 to 5 ft.	15"	75 lbs.
5 to 6 ft.*	16"	100 lbs.
6 to 8 ft.	18"	150 lbs.
8 to 10 ft.	21"	225 lbs.
10 to 12 ft.	24"	300 lbs.

*Note—needled evergreens of this size and larger require much larger ball sizes.

Tying up branches to expose base and protect limbs

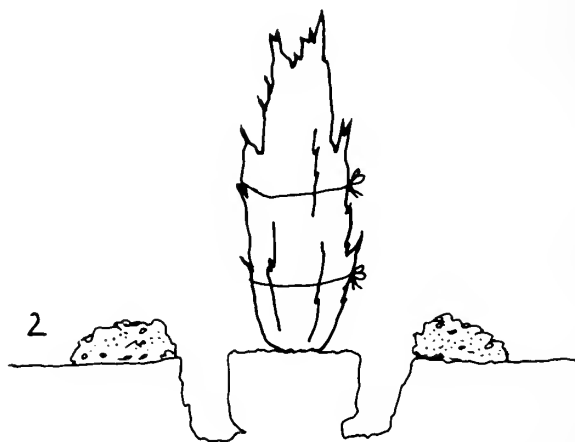


The first step in digging a plant with a ball of earth is to tie up the branches (and stems if it is a multi-stemmed clump) to expose the base of the plant and the soil around it. (Fig. 1.) This step is not necessary if one is transplanting a high-branched tree. The next step is to mark out on the ground the circle of the ball to be dug. This can be done with a nail and loop of cord or by measuring out from the trunk and marking the periphery with a spade.

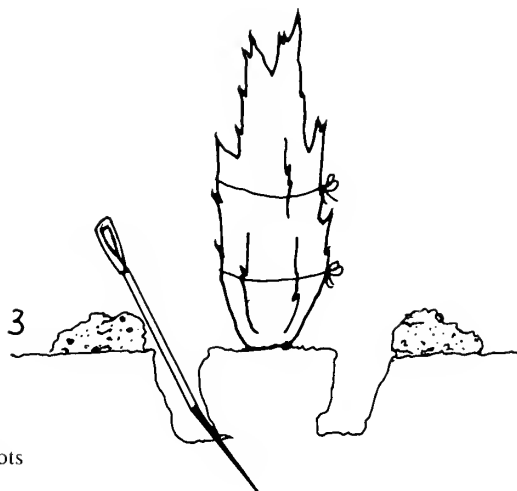
Then a trench is excavated around the outside of the ball. (Fig. 2.) A curved-bladed shovel can be used to dig the trench, but using a flat-bladed gardener's spade is much quicker and easier. For a small ball, up to

18" in diameter, only one spade depth (approximately 8") need be excavated. Then the spade can be reversed and thrust in repeatedly around the circle at an angle toward the center of the ball to sever the lower roots. (Fig. 3.)

At this point, especially in the case of small balls less than 18" in diameter, the ball can be reinforced by winding a rope around it at several levels and tying it fast or by encircling it with a wide strip of cloth or burlap and pinning the cloth to the ball with nails. (Fig. 4.) Once the ball is secured by this protective roping or cloth strip, the top of the plant can be bent over and the ball broken loose from the ground. Then a board



Digging a trench around base

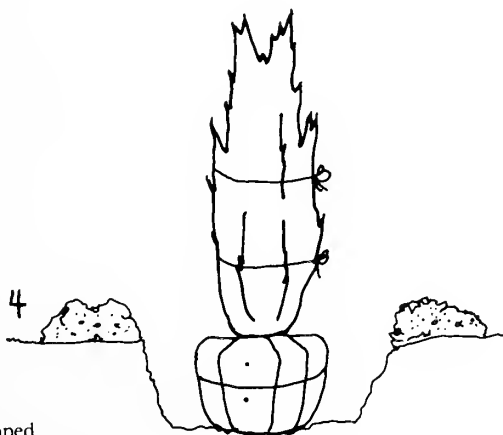


Severing the base roots

can be placed at an angle in the hole and the ball, if it is heavy, eased up the board and moved to its new location. (Fig. 5.)

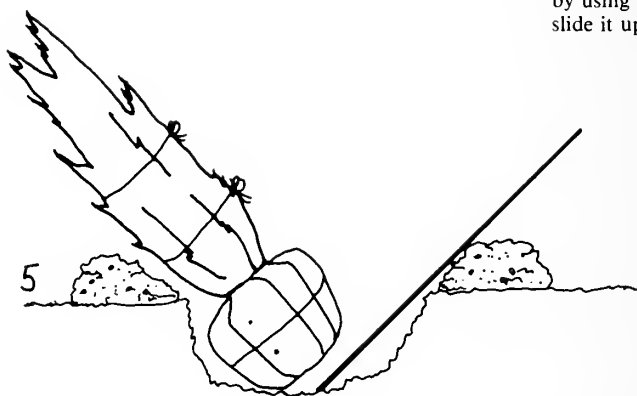
Larger shrubs and trees requiring balls up to 30 inches in diameter are balled in much the same manner except that the circular trench around the ball is dug wider and excavated down to the full depth of the ball. The ball itself is tapered in toward the bottom at about a 10° angle to make the roping easier and more effective. The whole ball is

covered with overlapping sheets of cloth or burlap which is pinned in place with nails. The base of the ball is encircled with a ring of rope and a second ring is pinned in place around the top of the ball (Fig. 6). The two rings are laced together by a zig-zag lacing of rope like the sides of a drum (Fig. 7). Then the top ring of the lacing is secured to the trunk of the plant by a series of lacings, each as tight as it can be pulled (Fig. 8). This has the effect of tightening the whole



Balled and burlapped

Removing a large plant
by using a plank to
slide it up the side



network securely so that the ball can be moved without any danger of its collapsing or breaking apart.

Still larger balls can be dug and properly laced by the home gardener. They are so heavy, however, that mechanical equipment must be used to lift them out of the hole and move them to and into the planting hole at the new location.

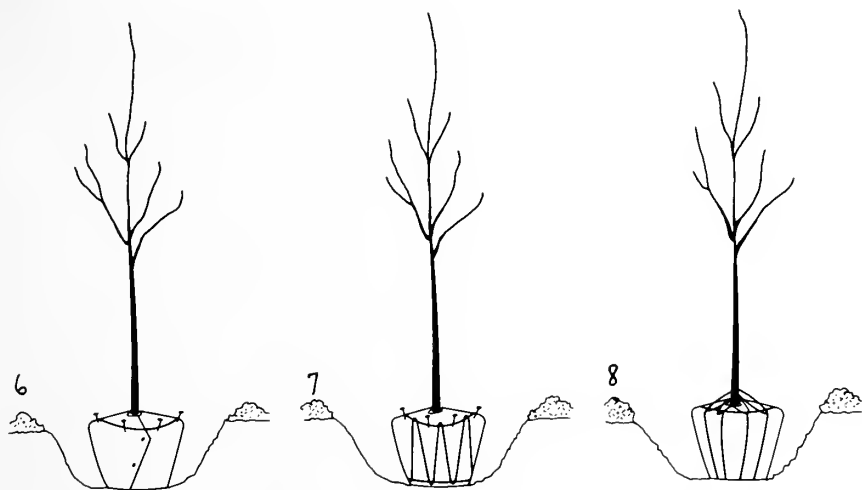
Once the plant has been dug and moved, the process of planting it follows exactly the same procedure as outlined in other articles in this handbook. Even though plants are moved with generously large balls of earth, some roots are inevitably severed, and this reduces the plant's ability to take up water, especially in dry weather. Therefore, best results occur if the tree's capacity to lose water (by transpiration) is also reduced to bring water intake and water loss back in better balance. This can be done by pruning back the tops and branches of newly transplanted trees and shrubs. As a rule, the central shoot or "leader" of a newly transplanted tree should be left intact, but the side branches should be shortened by one-third their length. The branches and tops of deciduous shrubs can be shortened by one-third their length, and junipers, yews and other needled evergreens benefit from a light shearing at transplanting time. (Fig. 9.)

Nonwoody Plants

Herbaceous perennials are also easily transplanted when they are dormant by digging them with a ball or clump of earth intact

around their roots. In most cases, herbaceous perennials such as iris, daylilies, hostas and peonies should be divided into smaller clumps when they are transplanted, since old individual clumps tend to produce fewer and smaller flowers as they become crowded. This dividing is easily accomplished by slicing the old large clumps into several smaller ones with a *sharp* spade. Here again a curve-bladed shovel can be employed, but a straight or flat-bladed spade is a much more useful gardening tool. It should be periodically sharpened with a file when it becomes dull. A dull spade, like a dull hoe, is an abomination.

Annual flowers and vegetable plants as received from the local garden center are usually grown in little containers or packs and are easy to separate and plant out. Homegrown seedlings or rooted cuttings are quite often much less successful. The main reason is that they are started too early in the spring and grown in insufficient light, unless the gardener has an artificial-light unit, so they may become excessively elongated, pale and soft, and will promptly dry out and die when transplanted into the full sun and exposure in the garden. The best homegrown seedlings are produced out of doors in cold frames or the various kinds of cloches sold in mail-order catalogs or garden centers. Started in the full sun, and given abundant air on warm days, such seedlings grow short and stocky, with thick leaves which resist the drying of sun and wind when they are set out.



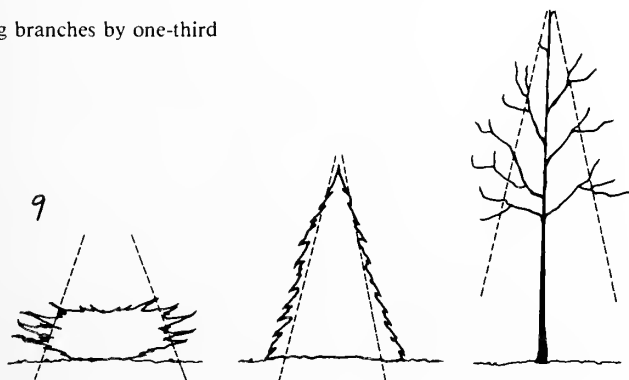
Steps in baling and burlapping

Seedlings started inside the house in windows or under artificial light should be moved outside in their containers, at first under a cloche or in an improvised cold frame with gradually increased "air" or exposure to harden them off before they are set out in their final places in the garden. Watering them with a dilute solution of soluble fertilizer a week before they are planted out helps them to resist transplanting shock and get off to a good start. If the weather is hot and windy at transplanting time, temporary protection for a couple of days under cones of translucent paper or plastic or even jars will give much better stands. Actively growing seedlings require

only a short time to root fast after transplanting, and then the temporary shelters can be removed. If seedlings have become too "drawn" or elongated prior to transplanting they can be planted with the roots deeper than normal and they will not flop or blow around and still make fine garden plants.

Be it merely setting out a few annual seedlings or successfully moving a large shade tree or evergreen, transplanting is an absorbing and rewarding part of gardening. Not a few young men and women have moved on from mastering transplanting in their family gardens to successful and lucrative careers in the nursery business. ♣

Shortening branches by one-third





A bad day is a good day for . . .

MOVING AND DIVIDING PERENNIALS

Frederick McGourty

"When can I move my peony?" Just about anytime, provided there is enough soil around the roots and you are willing to give postoperative care. I once even got away with it on an 85° day in May when I was renovating a flower border and had to lift all of its perennial contents. To my surprise, the peony bloomed beautifully several weeks later, as if it had never been moved. No wonder Grandmother was so fond of these plants!

Still, certain times of year are better for moving certain perennials than others. Peonies, for example, are among the few that are customarily planted in autumn; indeed, most mail-order nurseries will ship them only then.

Peonies are different in another respect, for the common practice is to plant them so that the ruby-colored buds, which are visible at the base of the plant in autumn, are an inch below the surface of the soil. These are the magic capsules that hold next year's promises. Coral bells (*Heuchera*) and bearded iris, the latter of which is cut back and divided after bloom in late spring, are other perennials that benefit from being reset slightly lower in the soil than their original depth. Practically all others should be planted at the same depth they were before, so their crowns won't rot. A submerged delphinium just becomes mush.

When is the best time to move perennials? If they are container-grown plants just

The first step in dividing chrysanthemums is to dig up a generous rootball so that each division will have enough roots to get a good start.

purchased from a garden center, they can be set out successfully in the garden almost anytime in the growing season, though it is best to avoid the dog days of midsummer and the very frosty times of late autumn. Cut lightly through the outer roots if they are encircling the container ball, as you would for container-grown shrubs and trees.

The ideal planting day is overcast, calm and cool—not so great for human beings, but awfully nice for the plants! If planting has to be done on a bright day, late afternoon is a good time, and should the extended forecast be for sunny, breezy weather, peach baskets or other loose protective cover ought to be placed over the newly installed plants for a few days. This practice is of real value in the re-establishment of plants, especially new divisions moved around within the garden as they start active growth.

Timing

The ideal planting time for fresh divisions of perennials varies according to climate. In the very coldest parts of the United States spring planting is safest, though late summer may work well for some plants, too. In the middle parts of the country, spring and early autumn are good. In areas with very mild winters, autumn or even winter is appropriate. Spring planting should be avoided if summers are normally bone dry. Concerning more precise information for your area, see regional charts beginning on page 5.

Except in very mild areas, the following perennials are usually ordered for spring delivery if you are dealing with a mail-order firm: yarrow (*Achillea*), Japanese anemone (*A. x hybrida*), plumbago or leadwort (*Ceratostigma*), dianthus, gaillardia, helenium, Christmas-rose (*Helleborus niger*), coral bells (*Heuchera*), hibiscus, kniphofia, rudbeckia, perennial sages (*Salvia*) and stokesia. Upon their arrival it helps to soak bare-

rooted perennials in a pail of water in a shady spot for half an hour before planting. Some gardeners like to add a scant teaspoon of water-soluble fertilizer to the pail, to serve as a starter solution.

In recent years many gardeners in the normally colder parts of the country have found that shipment of lily bulbs is better in spring than autumn. This is particularly true of tall summer-flowering hybrid sorts, which have a high mortality rate in part because their bulbs cannot safely be lifted by nurserymen for shipping until well into the fall season. Since many lilies are selling for \$4 or \$5 a bulb these days, it pays to be careful about planting times. Best stick with inexpensive tried-and-true sorts if you must plant in autumn: Mid-Century hybrids, including 'Enchantment', and regal lily (*Lilium regale*) and its hybrids. Madonna lily (*L. candidum*) is an exception to normal lily-planting seasons, for it should be planted in August or September, and then just an inch deep, as opposed to six or eight inches for other sorts. Their loss rate is high, but to some gardeners Madonna lilies have a strong appeal when in bloom in late spring. Extra lime in the soil is said to help.

Some perennials need to be divided every two or three years if they are to continue to grow well. These include many members of the Daisy and Mint families (Compositae, Labiatae). Telltale signs: if clumps take on the appearance of a traffic jam and become sparse in growth in the center due to self-strangulation, it is time for them to be lifted with a spading fork or hefty trowel. Frequently the lifted clumps can be broken apart easily with the fingers. Usually the soil around the roots need not even be removed. At other times, as with the woody roots of astilbe, a sharp knife is needed. The inner section of the old plant is discarded, and the divisions are made from the outer part. How many divisions depends on the number of plants desired, the season, and the nerve of the gardener. In the North, small divisions may be worth the risk in spring if a quick buildup of plants is required and flowers aren't essential the first year. Making small divisions in early autumn can be dangerous, however, because roots often don't have time to become anchored in the soil before winter. Heaving of new plants from the soil, from alternate



For the woody-rooted perennials such as astilbes or, here, peonies, a clean, sharp knife will make smooth, easier divisions.

freezing and thawing, is the main cause of death. Many a gardener, myself included, has lost tiny divisions made in consummate September greed.

The following perennials benefit from division every two or three years and can even be divided yearly if desired: asters, chrysanthemums, erigerons (some of which are literally autotoxic with age), heleniums, monarda and physostegia. In cooler areas spring is

the best time for this activity, when plants are two or three inches tall. Re-establishment is slower and more difficult if you wait until plants are five or six inches tall before dividing them. While plants are out of the soil, it is a good practice to work some compost or peat moss and a little superphosphate into the replanting area. Bee balm (*Monarda*), in particular, exhausts soil nutrients and "moves" each year.

Balanced commercial fertilizers such as 10-10-10 are not really needed when new divisions are set out, and they will be harmful if roots come in direct contact with them. However, a light application several weeks following division, and once roots are re-established, is often helpful. Upon setting out the new divisions, a gentle firming of the soil around plant roots is desirable, followed by a thorough, very slow watering. If soil is bone dry, water the area a day ahead. If this isn't practical, water the hole immediately before planting, then again after. As a rule, the area should be mulched with a



Check the depth carefully when replanting. Some perennials will rot if the crown is covered; others, such as these peonies, should be replanted somewhat deeper than originally to help them through the winter.

two-inch layer of some porous organic material (shredded leaves, buckwheat hulls, spent hops) to retain soil moisture and cut down on weeds. Keep mulch from direct contact with stems, to lower the chance of rotting. Follow-up care often determines success. If rains don't come, a good watering once or twice weekly for a month is advisable.

Knowing When and When Not To

It is usually better to make divisions out of large clumps than to transplant the parent in its entirety. Mature specimens, those more than several years old, often have trouble getting re-established since they no longer have a vigorous fibrous root system. Most notably, the following should be left on their own once they become senior citizens: monkshood (*Aconitum*), wild-indigo (*Baptisia*), gas plant (*Dictamnus*), euphorbia, baby's breath (*Gypsophila*), Christmas-rose (*Helleborus niger*), perennial statice (*Limonium*), Oriental poppy (*Papaver orientalis*), balloon flower (*Platycodon*) and yellow-lupine (*Thermopsis*). Lenten-rose (*Helleborus x orientalis*), unlike the Christmas-rose, is quite tolerant of division and the moving man. I remember a friend giving me a large clump one July, from which I had to wash the soil to rid it of a pesty intertwined hitchhiker, mugwort (*Artemisia vulgaris*). In the process I made a dozen divisions, and not one wilted. Even butterfly-weed (*Asclepias tuberosa*), despite its carrotlike root, moves more easily than the gardener thinks it has any right to.

Some perennials can be relocated within the garden even when they are in bloom, provided they have a fair root ball and are carefully watered. Temporary wilting is not serious, but plants should be shaded for several days. Candidates for this treatment include astilbes, chrysanthemums, coral bells, low-growing asters and coreopsis, and geum. Such shifting about can be important if border space for display is limited or if the local garden club descends on you with little notice.

A few perennials have stout, thonglike or woody root systems that lend themselves to division only with struggle. A very sharp spade and old pair of sharp pruning shears may be needed, as well as a good breakfast. Goatsbeard (*Aruncus dioicus*), black snake-

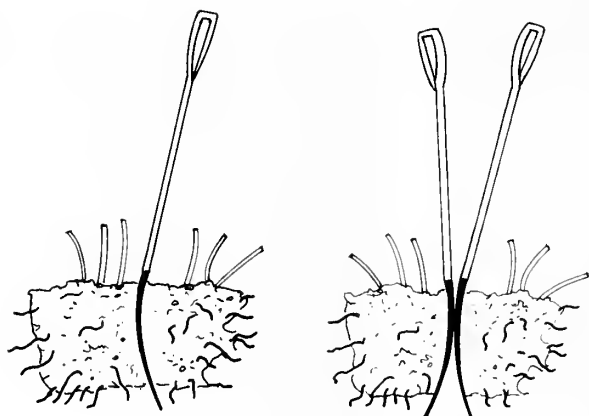


Unlike most bulbs, which should be planted about three times the depth of their height, the Madonna lily (*L. candidum*) must be planted only an inch or two below the surface.

root (*Cimicifuga racemosa*), globe thistle (*Echinops*) and some filipendulas are in this category. No doubt a few roots will be mashed or torn during the procedure. Cut them off cleanly before replanting. Such plants should usually be divided in very early spring before top growth appears, or in early autumn. Fortunately plants in this group do not need frequent division, or the gardener would have to invest in a pickaxe. In fact, goatsbeard and black snakeroot may never need to be divided or moved.

As Easy as Apple Pie

Hostas and daylilies can go without division for many years, sometimes indefinitely, depending on cultivars and growing conditions. It is a shame to break up a large clump which may be forty or fifty years old. Yet you want more plants! The dilemma is circumvented by making divisions much like the slices of an apple pie, removing one, two or even three slices with a spade and filling in the empty hole with compost. The task is most easily accomplished in early spring, before the leaves attain any size. A month after growth starts no one but you will know that the pie was pillaged. And if some of the fresh young leaves have been mangled, mix them in when you cook spinach.



Large, thong-like or tough root-balls can be divided more easily by inserting two spading forks back to back and prying the ball apart.

They are quite edible if slightly bland, and your spouse probably won't even notice.

If one is interested simply in increasing the number of hostas or daylilies and not in preserving a venerable clump, plants can be lifted and divided as mentioned on page 23, with a spade run through them once or twice. Another technique, if smaller, neater divisions are wanted, is to insert two spading forks back to back through a clump, gently prying divisions apart, and then redividing them into smaller units. Large divisions can be made at virtually any time of year when the ground is not frozen, but small ones are best made in early spring or late summer. The same technique applies to Siberian and Japanese iris (*I. sibirica* and *I. kaempferi* of the trade). If plants are in full leaf at the time of division, it helps to cut them back half way.

It was once the custom to divide spring bloomers in late summer or autumn, and autumn bloomers in spring. The second practice is still standard, because dividing a chrysanthemum or other shallow-rooted late-flowering daisy in fall can lead to its early demise. I know a gardener who has even killed his precious cultivated golden-rod from England this way.

The problem with the first practice is that the better part of the growing season is lost if one waits until autumn to divide a spring bloomer. Except where summers are particularly warm and dry, it makes sense to divide doronicum, Jacob's ladder (*Polemonium*), early phloxes and pulmonaria after bloom in April or May. That is, provided the gardener has time and inclination to do these

tasks then! Luckily, there are seasonal options for division, and most perennials are rather tolerant of our fits and starts if we just leave them alone during the hottest and coldest parts of the year.

A Little Coddling

What about winter protection? In the North, if potted perennials have been set out in the course of the year, a light winter cover of evergreen boughs or salt hay around Thanksgiving, mainly to keep an even soil temperature over winter, is a good idea, though it is superfluous for hostas, daylilies, sedums and summer phlox. Many of these will even overwinter in containers above the ground, provided they have a little cover. In general, give the most cover to naturally shallow-rooted perennials, chrysanthemums, shasta daisies and leadwort in particular, and ones you know are of borderline hardiness. Newly-divided plants should also receive a little protection the first winter, especially if fall planted. In all cases, remove the cover gradually, as the crocuses come into bloom in spring. Large-scale coddling is not in order for established perennials, though in unusually cold, dry winters such as 1979-80 and 1980-81, some losses can be expected. Such is gardening.

If you have read this far, you probably want to learn about making or renovating a border for perennials, and about different plants for different effects. We suggest that you turn to the Brooklyn Botanic Garden Handbook *Perennials and Their Uses*, #87 in our series. See the back cover of this Handbook for ordering information. ❀

Peat Balls

A lot of people stumble over the idea of planting a bare-rooted shrub, though there is no mystery to the process. And transportation costs get higher and higher for balled and burlapped shrubs, which are heavy. So a machine was invented to fabricate a ball of peat moss around the roots of a bare-rooted shrub and then tightly encase it in polyethylene. The package is lightweight and looks attractive, and the uninitiated gardener might confuse it with one that is balled and burlapped—until he gets home.

One thing to be said for peat balling is that the roots do not dry out as quickly as they do in the case of bare-rooted shrubs that have their roots packed in sphagnum or shavings. However, peat-balled plants, like any other, are apt to sit around a garden center for a while and start growing. Peat itself happens to be a fine *rooting* medium, and in no time all sorts of fibrous little roots start to appear. The difficulty begins when such a plant is set out into the garden, because the surrounding soil, which is not nearly so hospitable, will serve as a virtual wall against root expansion. Frequent result: plants languish, then slowly begin to die.

How to get around the problem? If you purchase a peat-balled shrub, it is best to do so early in spring and then only from a garden center with a good turnover. The shrub should not yet be in leaf, for the next step after digging a \$10 (better a \$20) hole is to shake a large portion of the peat from the ball into the hole, perhaps adding even more peat. Work this in thoroughly with the soil around the edges of the hole, then plant the now nearly bare-rooted shrub in your favorite manner. Some cutting back of top growth at this time will be desirable if the shrub has not been pre-pruned. ♣

Root Pruning

To move or not to move, that is the question. Established shrubs or trees, of course. Old plants don't transplant well, and it is usually best to start out with new nursery-grown ones which will grow vigorously because of their youth and compact root systems, which have been routinely pruned in the nursery. However, there are times when medium-sized shrubs or trees need to be shifted around. The trouble is, the roots have spread far from the base of the plant, and you will recover only a small portion when you dig.

Forethought is the key. One year before you intend to move an established shrub or tree, sharpen your favorite spade and dig a narrow trench in accordance with the ball dimensions given for plants of particular sizes on page 17. Sever every root in the way, using lopping shears for the larger ones and making clean cuts. Fill back in with soil and remove some top growth if you have cut through a number of medium-to-large roots. Water well, as if it were a new planting.

In the ensuing year many new roots will grow close to the base of the plant resulting in a compact root ball. Best time for the operation: late winter or early spring. Make the ultimate digging and lifting of the plant a two-person operation, for the ball will be hefty; it will also probably need to have burlap wrapped around it, a cumbersome operation for a solitary gardener. Avoid lifting the ball out by the trunk or stems.

Larger trees require more time to prepare. The procedure is to divide the circumference into four parts, root pruning two opposite parts late one winter, the remainder the next. The tap root, if present, should be cut, and the tree lightly staked. The tree is then moved late in the third winter. The method works well, but the gardener must consider if it is better to buy a fair-sized new tree, for in three years it will have made solid growth and be thoroughly re-established, whereas the root-pruned tree will just be getting started.

Root pruning is most helpful if you plan to move a tree or shrub from the wild. It is also done to encourage a shy plant to bloom. Lilac, in particular, is so active in vegetative growth that flowers may not appear for years. A cup of superphosphate is added to the backfill upon root pruning, and the shrub is kept in its location. ♣

Coming Up Roses

There is no secret to planting roses as long as you think of them as shrubs. They are in fact just that, even their scandent subgroup, the climbers. It is true that their blossoms lend special grace to the garden and that the commoner sorts, the hybrid teas, floribundas and grandifloras, bloom intermittently through the pleasant months, whereas most other shrubs flower just two or three weeks. These kinds of roses are not long-lived plants—ten or fifteen years is par, provided growing conditions are good—and northern winters can be exceedingly rough on them. Even their most ardent admirers will admit their shortcomings of growth habit compared with other shrubs. Still, most gardeners like to have a few roses around, particularly for cut blossoms. After all, it is America's most popular flower.

What are good conditions? Sun for at least six hours a day, good drainage, enriched soil, excellent air circulation, an inch of water a week if it doesn't rain, though this last point is often a pipedream. Not too different from the growth requirements of many other shrubs, too!

Roses may be purchased bare root from mail-order firms or some garden centers. Sometimes they are potted up in a container like any other shrub. Often these days they are pre-packaged with a mixture of peat moss and other ingredients around the roots, ready to be planted, biodegradable-container-and-all, in the soil—or so the directions say. In this last case, some gardeners prefer to remove the container (which doesn't always rot away quickly in the soil) and partially bare-root the plants, incorporating the peat mix in the soil. This works well only if plants have not leafed out fully.

Spring planting is desirable in the North, and indeed this is the only season when most nurseries have a selection of roses. In milder climates autumn or even winter planting is normal. A good-sized planting hole (adjusted for inflation, the \$25 size is advisable), with a pail or two of moistened peat moss or compost and half a cup of superphosphate mixed into the soil but kept from direct contact with roots. Plant as you would any other shrub, but if you live in a colder part of the country set the tenderest part of the plant, the bud union, which is the knobby portion at the base of the plant where the rose was grafted, one or two inches below the soil surface. After watering, rose plants are usually mounded with six inches of soil, which is removed as new growth starts. In cold climates they are mounded again in late autumn for the winter. If the roses have not been substantially pre-pruned, cut the canes back to one foot, and remove ones that are rubbing against stronger ones or that will cross during the growing season.

More information on the subject can be found in Brooklyn Botanic Garden Handbook #92, *Roses*. If roses are of particular interest to you, make a point of visiting the Cranford Rose Garden at BBG this year. It is the third largest in the United States in kinds grown.

Herman Gantner



After pruning back and planting in well-conditioned soil, water thoroughly before mounding soil up an additional six inches until new growth begins.

POST-MOVING CARE OF CONTAINER-GROWN PLANTS

James Cross

Plants which have been grown in containers require direct and careful watering after they have been planted and until they become well established in the surrounding soil. The care required is in addition to that normally given all new transplants. Plants dug from the ground have many of their roots cut, thereby stimulating root growth, which in turn hastens their eventual re-establishment. But the container-grown plant's roots are not disturbed by the removal of the container before planting and it has no immediate incentive to send roots into the surrounding soil. Most fatalities of container-grown plants result from the plant drying out. This can happen even when the surrounding soil is still quite moist.

Time to Recoup

The critical period of time until the plant becomes established will vary according to soil conditions. The longest is that when a plant in a light, porous container-growing medium is placed into a heavy, sticky soil; the next longer is from a heavy-textured container medium into light soil. The amount of extra water required will vary with the type of plant (fine shallow-rooted ones require greater frequency) and the stage of growth (more frequent where there is soft new growth and/or flowers to support) and, of course, the type of soil (more frequent for sandy soils). As a rule, for average soils with good bottom drainage, provide one inch of water at least once each week during the first summer. A heavy mulch will help hold moisture.

Steps can be taken to shorten the critical establishment time. First, prepare carefully a large planting hole, one that is several times the size of the existing root ball. This is to provide a zone around the plant for easier transition of the roots into their new home. Remove one-quarter to one-half of

the planting-hole soil and replace this volume with materials which give more friability to the soil, thoroughly incorporating them with the remaining soil. The more extreme the existing soil conditions (heavy clay or light sand), the more supplementary materials must be added. Sand and perlite-type materials are good for loosening heavy and sticky soils, but add no organic matter. Peat moss is excellent in heavy clay soils and essential for light sandy ones. When using peat moss, it is important to mix it very well with the soil. Make certain also to dig very deeply to eliminate any drainage faults which may lie beneath your plant. Almost all plants need good drainage.

The Need to Prune Roots

The next step is to loosen or cut some of the roots before planting. By extending some of the roots out into the planting hole you begin to break the former root habits. For fine-rooted plants, gently loosening the outside layer of roots should be sufficient. When roots are coarse, loosen them or cut them with a clean sharp knife or pruners—particularly if they are severely coiled on the sides or bottom. Bad kinks and coils should be eliminated. If a lot of roots need to be cut away in the process, compensate for this by pruning back or thinning out the top of the plant. While undertaking these steps, do not allow the roots to dry (see p. 12). When backfilling the hole, create a circular ridge or dam to form a water basin located so water that collects will go directly into the root ball rather than into the surrounding prepared soil.

If container-grown plants are set out in late summer or fall, assume that they will go into the winter without being thoroughly established. Provide some winter protection (sun and wind break) for the foliage if the plants are evergreen. ❧

WATERING

Thomas Buchter

Watering plants correctly is vital for developing and maintaining a garden. Lack of water can cause a plant to wilt and ultimately dry up. Excessive water can cause root rot, in which instance the plant wilts because it is oxygen-starved and, consequently, is unable to take up moisture. As a rule, plants are capable of withstanding moderate drought more easily than too much moisture. For this reason it is important to water thoroughly, yet allow the soil to become fairly dry between waterings.

Wilting is a condition brought about in plants when roots are unable to supply sufficient moisture to the stems and leaves. Wilting for short periods of time will not harm plants; over a prolonged period, however, it will cause permanent damage. Sometimes a plant will wilt on a hot day because moisture is evaporating from the leaves faster than the roots can supply it. If there is ample soil moisture, the plant will absorb water in the evening to firm up the stems and leaves.

In late summer or early fall it is not uncommon to experience a sustained period of wilting, particularly of broad-leaved evergreens such as rhododendrons. The latest research establishes this condition as the cause of much leaf damage typically attributed to winter desiccation. When the leaves *first* hang down and no rain is predicted, it is advisable to provide prolonged, deep (1-2") waterings to keep leaves turgid.

The gardener will save time watering and plants will be healthier if the following considerations are kept in mind:

1. Know the condition of your soil. It is important to observe how quickly the soil dries out after a rain or watering. For example, a clay-type soil will need less watering than a sandy one. Clay soil drains slowly, porous sandy soil quickly. The addition of organic matter to the soil will increase drainage in clay soil and moisture retention in sandy soil. When preparing a hole for planting, if the subsoil at the bottom of the hole is very hard and prevents water from draining quickly, it should be broken up with a shovel or pick and organic matter added to improve drainage.

2. Learn the cultural requirements of plants being grown. Different plants have different water needs; azaleas require more moisture than poppies or cacti. The use of good reference books will provide the gardener with this information.

3. Mulch plantings to reduce the frequency of watering during dry spells. Mulches help keep soils cool and reduce water loss through evaporation.

These three factors will have a direct effect on garden moisture needs and will determine when to water and how often.

Tools

As with any job, to do it properly the gardener must have the right tools, namely:

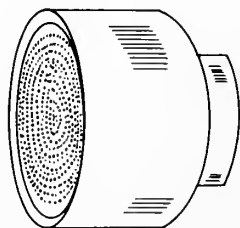
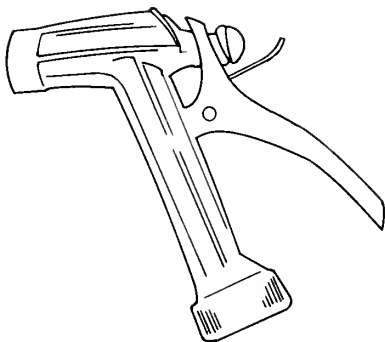


Fig. 1. A water-breaker cuts the pressure, giving a gentle, easily aimed stream

Fig. 2. A trigger-type nozzle is not recommended because it can wash away the new soil



hoses, water-breaker, sprinklers, sprinkling can and utility pails.

When acquiring a hose, make sure it will reach all plants in the garden so the end can be placed at the base of any plant. When watering individual plants with a hose, attach a water-breaker (Fig. 1) to the end. It will concentrate a soft flow of water in a small area but will not wash away soil. Don't use a trigger-type nozzle (Fig. 2); it will wash soil away from roots.

If the hose is attached to one faucet and used to water plants in various parts of the garden, you may want to put $\frac{1}{2}$ "-diameter pipes or wooden posts, cut in 2' lengths and sunk 1' deep, at the corners of perennial and shrub beds. This prevents the hose from being accidentally dragged over plants during watering.

There are many types of good sprinklers

on the market. One type is a Spike Sprinkler (Fig. 3) on a riser that can be adjusted from 2' to 4'. This sprinkles above shrubs and small trees, providing excellent water distribution. Sprinklers should not be used on windy days, because water will be blown from the desired location.

Sprinkling cans (Fig. 4) are appropriate for watering vegetable and flower seeds sown directly in the garden. A hose used for this purpose can cause seeds to be washed away. Until seedlings become well established, they should continue being watered with a sprinkling can. Utility pails (Fig. 5)

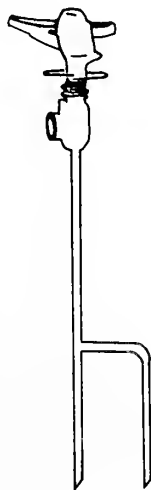
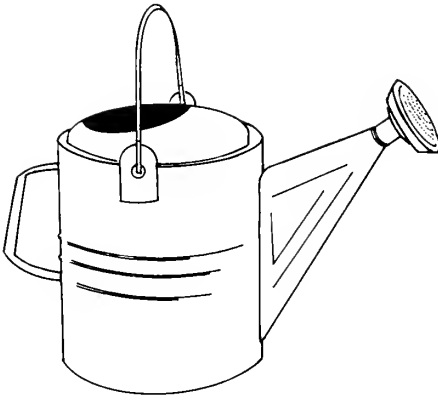


Fig. 3. A spike sprinkler can be variously adjusted for height, area and pressure

Fig. 4. For directly-sown seeds, a watering can with a nozzle can help avoid washing them away.



are helpful when only one or two newly-planted shrubs or small trees need water.

Some Watering Techniques

If the soil is dry when preparing a hole for a new plant, dig the hole and fill it with water the day before the plant goes into the ground. This allows the soil time to absorb water and does not create a muddy condition during planting. Once a tree or shrub has been planted, the soil around the stem should be shaped to create a shallow depression the diameter of the root ball. Fill the depression with water (Fig. 6). This permits water to go straight down to the root

zone rather than run off the surface. Thorough soaking after planting eliminates air pockets around roots.

It is important when planting (particularly container-grown material) to avoid covering the top of the root ball with more than $\frac{1}{2}$ "-1" of fine soil. Otherwise water can be diverted sideways through the native soil and not soak down into the root ball where it is needed.

When there is an extended period without rain during the summer, new plants should be deeply watered once a week. By allowing the soil surface to dry out somewhat between waterings, roots will be encouraged

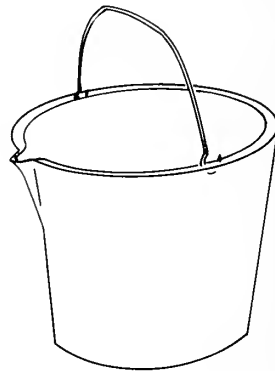
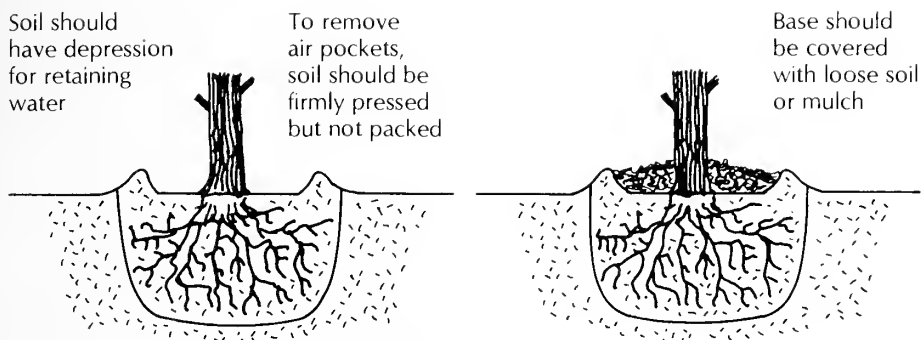


Fig. 5. A utility pail can be used to water shrubs and small trees without dragging around a hose.

Fig. 6.



to grow down, rather than sideways, in search of moisture. Plants watered frequently but lightly will have roots too close to the surface, making them more vulnerable to wilting. They will not become well established and will have little drought tolerance. This happens with automatic sprinkler systems that are designed to go on for a short period of time each night. This latter practice also encourages many foliar diseases in midsummer.

During cooler seasons less watering will be necessary because evaporation from the leaves and soil is slower. Normally, abundant rainfall during spring and autumn diminishes the need for watering. During any dry autumn before the ground freezes, all garden plants should have a thorough watering to help prevent root damage to the plants from the cold temperatures of winter. Damage to roots from unusually cold temperatures around the roots shows up in the spring in the form of leaf drop because there are then not enough roots to support all of the foliage.

With well established groups of perennials and woody plants, watering should be done every ten days to two weeks during prolonged dry spells. Since root systems of established plants are rather widespread and deep, it is vital that enough moisture be put down to reach them. A general rule of thumb is that one inch of water penetrates six inches of soil. If a sprinkler is set up to water a group of plants, a coffee can should be placed in range of the sprinkler. When one inch of water accumulates in the can,

one inch of water has been distributed in the soil.

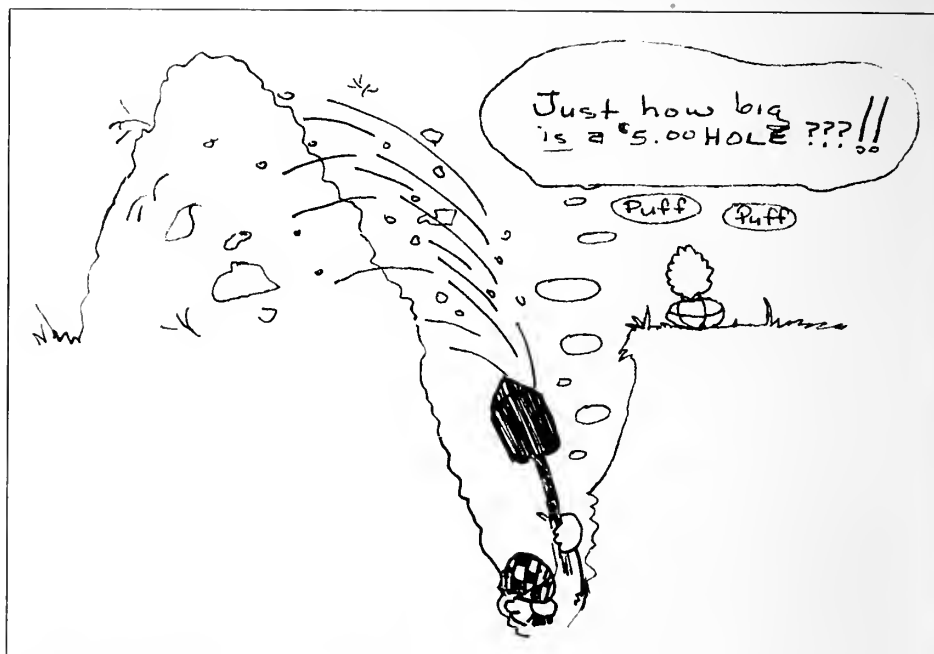
Plantings watered by surface flooding need some form of water retention to prevent run-off. Shallow trenches can be created between the rows of plants and flooded to a depth of 1" to 2". This method works well in vegetable gardens on level ground where plants are grown in rows.

The best time to water is in the morning or evening when air temperatures are lower than at mid-day, thus reducing evaporation. In the evening do not wet foliage because this can encourage fungus or mildew, making plants unsightly and jeopardizing their health.

Water Conservation

Water conservation is especially important during drought conditions. There are many ways we can conserve water and recycle it. Certain types of household waste water can be used. Rinse water from the washing machine, if it does not contain fabric softener or bleach, can be used. Bath water can also be used. Large amounts of water are wasted when we let the cold water run out the hot water faucet until it is hot enough for our use. This can be collected in buckets or pots and used in the garden or for house plants. Water used to rinse fruits and vegetables can also be saved.

Rain barrels can be placed under downspouts to catch rain water. Keep the barrel covered to prevent mosquitoes from breeding in the water. Pails can also be set out to catch water when it rains. ♣



Concentrate on . . .

CONDITION OF THE SOIL AND PREPARATION OF THE HOLE

R.L. Snodsmith

"A 50¢ plant in a \$5 hole" and "plan before you plant" are the two most important rules in gardening, whether you are landscaping a home with trees and shrubs, putting in a vegetable garden, or creating a perennial garden for a symphony of bloom. Other than selecting the right plant for the given environment, there is no other single factor that is more important than understanding the soil and using this understanding to make proper preparation of the soil. There is no practice in gardening that will have as long-lasting an effect on plant growth.

Let's start with defining an ideal soil. It would consist of 45% soil particles such as sand, silt and/or clay, 5% organic matter in the form of humic acid, 30% air and 20% water, the latter two varying as water is added and then drains.

Soil particles such as sand, silt and clay vary greatly in size. Compare the sizes: a sand particle would be the size of the Empire State Building, a silt particle the size of an average two-story home, and a clay particle the size of a cigar box. An ideal soil will contain particles of all sizes. Soils containing particles of predominantly one size, such as mostly sand or mostly clay, can present real problems for the gardener.

Humic acid, the end product of decaying organic matter, is the cement that holds soil particles together as well as apart. It is the bonding agent that helps create stable aggregates of soil. Without humic acid, sandy soils will fall apart and clay soils will become so compact that roots, air and water will not penetrate. This is why we should blend in peat moss, compost or leaf mold as

a regular part of most any planting procedure. Organic matter also increases the soil's ability to become a storehouse for nutrients.

Air and water relationships at the ideal 30% and 20% levels respectively encourage healthy roots and beneficial chemical and microbial action in the soil. Soil which has become compacted by foot or vehicular traffic do not contain the air and water necessary for healthy growth.

Soil Preparation

Steps in proper soil preparation for planting include soil testing, checking for drainage conditions, determining the hole size requirements and amending the backfill for planting.

A soil test to determine the pH is useful in order to provide the best soil environment for the establishment of roots and the retention by the soil of nutrients. A soil that is too alkaline or acid may not release nutrients as needed by the plant, causing poor growth with symptoms such as chlorosis. Soil samples for such tests should be taken in the area of root growth, not at the surface. In soils that vary in characteristics such as color and texture, separate samples for each section should be analyzed. The pH test, which may be done at the site, will give a guide to the amounts, if any, of lime or sulfur needed to adjust the soil more in line with plant needs. (See page 43.)

Though it is not often done, a more complete soil test should be performed to determine what major nutrients are present and in what quantities. This is usually a test for

nitrogen, phosphorus and potassium, three elements absolutely necessary for plant growth. Other elements may also be checked for at the same time.

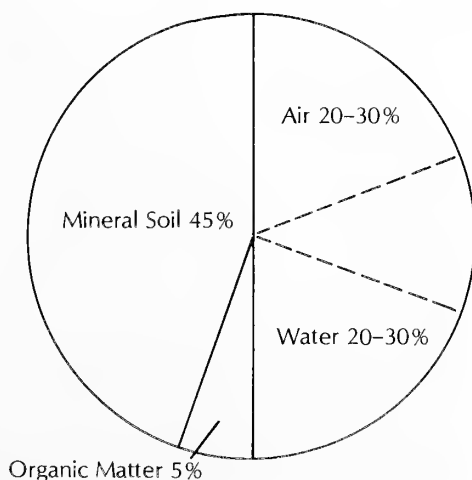
Drainage is probably the one soil characteristic that is the most critical to the health of your plants. If there is any doubt about the ability of the soil to drain properly, after digging the hole fill it with water and allow it to stand overnight. If complete drainage has occurred in this period, you are ready to plant. If not, further preparation is necessary or you will, in effect, be planting in a bucket without a drain hole—sure death for the plant.

Several methods are used to improve drainage. They include digging a deeper hole in an attempt to break through the compacted clay layer known as "hard pan," incorporation of agricultural gypsum into the subsoil to expand the soil particles over a period of time, or the installation of a drainage system. For the latter, it may be best to contact a professional soil contractor or landscaper. In some cases raised planting beds may be the answer.

Preparation of the Hole

In general, the diameter and depth of the hole is determined by the size of the ball, container, or, in the case of bare root plants, the spread of the roots. A minimum dia-

The proportions of components in an ideal soil. Air and water vary according to how recently the soil has been watered.



Kay Kling

meter for the hole should be twice the diameter of the spread of the root system and the depth $1\frac{1}{2}$ times the depth of the root system. A hole this size will allow thorough examination of the soil and its characteristics.

To be a good gardener and allow for ease of cleanup, all soil removed from the hole should be piled onto a piece of canvas or heavy plastic. This soil will become part of the backfill. Remove any debris such as rocks and roots. Mix thoroughly by volume as much as 25 to 50% organic matter with the soil. This organic matter may be in the form of milled peat moss or well-rotted compost. In poorly drained soils, sand may be added at the same time. This is also the time to incorporate any phosphate or calcium, the latter in the form of pulverized limestone or gypsum, by mixing it in well with the backfill. (See article on fertilizing, p. 39.)

In areas with extremely poor or shallow top soil, it is desirable to replace the poor soil taken from the hole with good quality top soil as part of the backfill mix. This is often the case where construction backfill has been used next to a foundation or where native soils are predominantly clay or sand.

Planting

Planting is the next step. It is recommended

that you dig the hole and prepare the backfill before purchasing the plant. The only problem with this procedure is if the root spread is greater than the prepared hole it will be necessary to enlarge the hole to accommodate the roots.

For balled-and-burlapped plants, place backfill into the hole so that when the ball is set in the hole it will appear slightly higher than it was when growing in the nursery. This will allow for settling of the backfill that is in the bottom of the hole. If there is any doubt in the planting level, lay a shovel handle across the hole to judge the planting depth. Now step back from the plant and take a look. Every plant has a good and bad side. Position the plant at this time by turning it so the good side is viewed. Always remember to handle the plant by the ball and not the stem. Handling the plant by the stem may cause loosening of the soil from the roots.

Fill and firm the hole to half full. Add plenty of water to settle the soil. This will take out air pockets that might cause drying of the roots and is much preferable to using the foot. Now untie or cut the burlap and any rope from around the stem and fold it back into the hole. You need not remove the burlap if it is the cloth type. (If plastic burlap and rope is used it must be removed



All photos by Herman Gartner

First step is to measure the root ball, height and width.



Second step is to measure the depth of the hole after preparation (below) which should include the incorporation of peat moss or other organic matter into the soil to increase aeration and water retention.





Check that depth is correct. Now is the time to rotate the plant (move root ball, don't twist trunk) so the best side is to the front.

before the backfill is placed in the hole around the ball. Plastic and nylon burlap will not rot and will restrict the root penetration into the backfill, and plastic twine can girdle the stem.) Now the balance of the hole may be filled and firmed with the prepared backfill material. Do not cover the top of the ball by more than 1" of the native soil used as backfill, especially if the native soil is of finer texture than the soil in the root ball. If the difference in texture is great, the native soil will absorb and divert the water intended to reach into the roots and the plant can be lost by lack of moisture. Leave a dish-shaped depression in the surface around the stem to trap and guide water more effectively. Be sure to place this rim so that it directs the accumulated water into the root area and not into the back-filled area beyond the roots.

For container stock, the same procedure is followed with these additional steps. First, remove the container. Examine the root system; if it is a mass of coarse roots and is developing a coil at the bottom, pull the coil and spread it out into the hole. It is also necessary to cut or pull loose the roots

on the side to allow them to penetrate into the soil mix. Container-grown plants often have pot-bound roots that, if not loosened or spread out, will grow slowly or completely fail to grow into the surrounding soil. Even with those plants that are in a "plantable container" remove it or tear it apart so the roots will get out as soon as possible.

For bare-rooted plants, the hole must be large enough to spread the roots to the fullest extent. Avoid root pruning whenever possible. Broken or damaged roots, however, should be removed. Do not coil roots to fit into the hole. This may cause roots to girdle the plant and choke it to death. Since roots generally grow in a somewhat downward direction, make a cone-shaped soil pile in the bottom of the hole to allow spreading of the roots in all directions. Backfill is worked around the roots and firmed to remove any air pockets. Once soil is added to the roots, do not turn or adjust the plant level. The planting level of bare root plants is judged by the color change in the bark near the base. There is a distinct difference between bark that has had soil contact and bark that has not. ♣

For more efficient growth, learn about . . .

FERTILIZERS— WHEN, WHERE, HOW MUCH

Andre Viette

Every gardener, landscaper, plant collector or nurseryman has his own special method of planting and fertilizing new plants. And in most cases all are equally successful.

Questions arise, however. To fertilize or not to fertilize when planting? Will I burn the roots? Can the roots take up the fertilizer? Do I wait one year to feed? You have probably heard these queries and a lot more.

Other factors make things even more complicated: many new fertilizers have entered the market and many formulas have been changed, even though the brand name has not. There are organic and inorganic fertilizers, and within the organic plant-food group, some are relatively soluble and quickly available while others are slow-acting. (It should be noted that whichever fertilizer is used, the nutrients must be in inorganic form for the roots to take them up.) Timed-release fertilizers which release nutrients steadily over a given period are now on the market. The adequacy of the root systems of bare-rooted, balled-and-burlapped or container-grown plants affects the ability to absorb nutrients. The degree to which the container plants are pot-bound, whether the plant has tap or fibrous roots, and the presence and condition of root hairs also affect absorption.

We have a choice of granular or pelletized formulations. For foliar feeding, powder or liquid preparations are at our disposal. Hundreds of different materials are used to prepare fertilizer blends, each having different properties. The diverse combinations of ingredients in fertilizers vary in their interaction with one another, and the availability of particular nutrients is affected by the relative acidity and alkalinity of the soil. Some fertilizers contain only one or two needed elements while others are very complete. Certain fertilizers add organic acids, humus and other beneficial byproducts in addition to nutrients.

To decipher this bewildering entanglement, we must simplify the entire fertilizer question.

PROBLEM: To ascertain the role of fertilizer in transplanting.

GOAL: Survival of the plant and adequate growth through the year.

PURPOSE:

1. To provide the plant with the slow release of nutrients through the year.
2. To furnish needed essential elements in such quantities as not to create spurts of growth (peaks and valleys).
3. To prevent root burn (plasmolysis).

WHAT TO USE:

1. Many 75–100% organic fertilizer blends provide a slow release of essential elements over the growing season.
2. A fertilizer containing a variety of ingredients will have the best chance of supplying most of the essential elements. (It can be a special fertilizer for certain groups of plants or various brand name plant foods.)

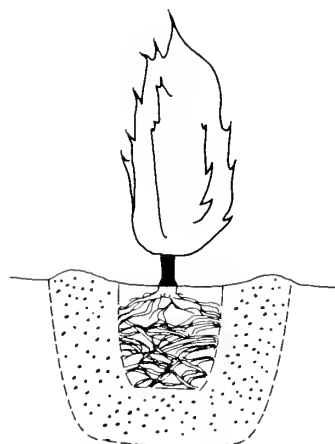
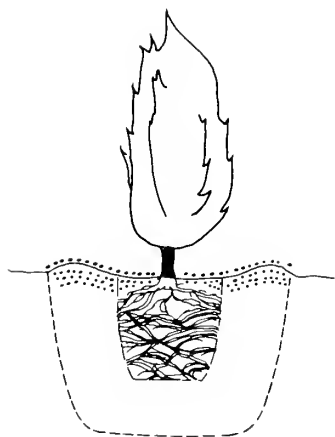
HOW MUCH: These rates are based on slow-acting fertilizer, with the understanding that handfuls vary and formulas vary. Use slightly higher rates on soils high in organic matter or on clayey ones. Use slightly lower rates on sandy soils or on ones low in organic matter.

1. 5 pounds per 100 square feet of garden; blend in bed.
2. 2 handfuls per plant for 2-foot diameter root zone; 4 handfuls per plant for 3-foot diameter root zone; 8 handfuls per plant for 4-foot diameter root zone.

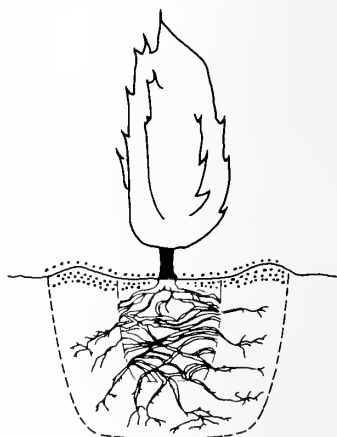
METHODS:

1. Surface feed after planting—a good general rule to follow.
2. Surface feed at a later date after the plant has made substantial roots. This is useful when planting in mid- to late summer and on very sandy soils.

Both 1 and 2 above do not answer “the



Left, surface feeding after planting. Below, surface feeding after roots are established. These methods are good for nutrients that readily move through soil.



To place phosphorus closer to the actively-growing roots, it must be incorporated in the prepared soil used to fill in the hole. A warning: too much can burn the delicate new roots.

phosphorus problem." Most phosphorus moves only slightly and very slowly from where it is placed on or in the soil. Phosphorus does not leach readily since it combines with calcium, iron and aluminum, among other chemicals, so the plant must seek out phosphorus where it is located in the root zone.

A good practical and nearly riskless solution is to add phosphorus alone (or in combination with calcium, added to adjust the soil pH) to the backfill used in planting an individual plant or into an entire bed, if prepared prior to planting. In either case the phosphorus should be *blended* with the soil so it is well distributed. Phosphorus is generally available from your local suppliers in the form of either double (19-20%)

or triple (40-45%) superphosphate. A rule of thumb as to quantity of triple superphosphate would be a very small handful for a plant with an 8-10" root ball, two small handfuls for 12-14" root ball or 25-30 lbs. per 1,000 square feet of planting bed area. At these rates there should be no worry about the additional phosphorus which would be part of the complete fertilizer applied to the surface under methods 1 and 2.

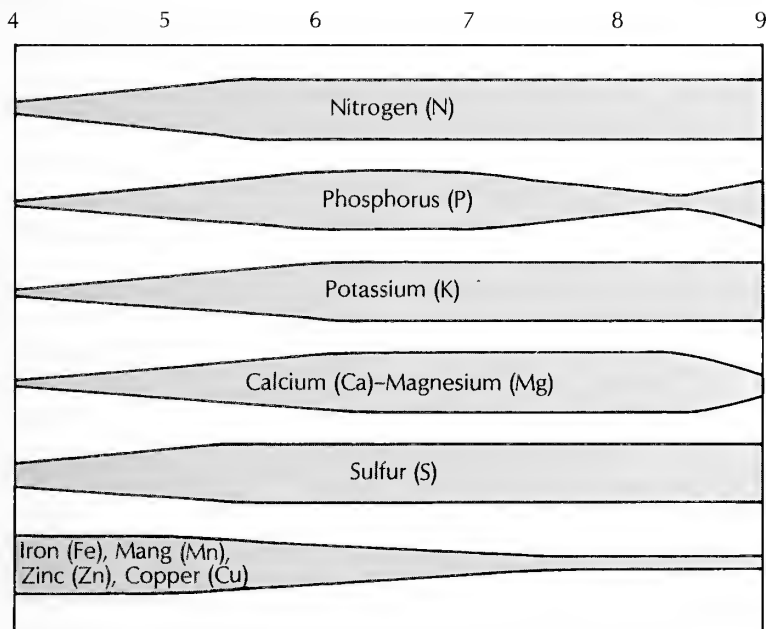
3. Blend the fertilizer throughout the root soil zone. This places the fertilizer where the roots will be. Such a method works satisfactorily, but it requires more care. There is more risk of burning the roots, should too much fertilizer be applied.

Whether planting a bed of flowers or individual shrubs, evergreens or ground covers, annuals or perennials—the above instructions apply.

DOs and DON'Ts:

1. Do use the correct amount of fertilizer.
2. Do use a complete fertilizer.
3. Do blend the fertilizer in the root

pH



Nutrients have differing availabilities at different levels of pH. Although plant needs vary, a pH of 6.5 is close to optimal for most.

zone, especially if it is bone meal or super-phosphate.

4. Don't line the hole with fertilizer; blend it.

5. Don't place fertilizer in the bottom of the hole.

6. Don't use inorganic, fast-action fertilizers unless you use them correctly and sparingly.

7. Do use a slow-acting sustained-release fertilizer.

The Role of Fertilizer in Plant Nutrition

There are at least sixteen elements known to be essential for plant growth, flowering and fruiting. Most are absorbed in ionic form through the root hairs.

Major elements are needed in relatively large amounts. Most carbon, hydrogen and oxygen are obtained from the air and water. Nitrogen, phosphorus, potassium, calcium and magnesium are obtained from the soil, fertilizer and lime.

Minor or trace elements are needed in smaller amounts. These are boron, chlorine,

copper, iron, manganese, molybdenum, sulfur and zinc. *Additional trace elements essential for certain crops under certain conditions* include barium, fluorine, cobalt, iodine, silicon and strontium.

Nitrogen = N. Nitrogen provides for healthy vegetative growth. Too much nitrogen will result in an overly-succulent plant, poor flowering habit and large, thin-walled cells, resulting in less resistance to disease. Lack of nitrogen results in a reduction of growth and possible yellowing of foliage and stunting of the plant.

Phosphorus = P. This element is important in all functions of growth and cell division. It is vital for the production of flowers, fruits and seeds and for promoting root development and strong cell walls. It balances excessive nitrogen. Trees, shrubs, vines and evergreens which failed to flower may be helped by the application of phosphorus.

Potassium = K. Potassium is important to general vigor, root formation and resistance to disease.

Minor trace elements. Minor trace ele-

ments are present in most soils. Many of them occur as impurities in fertilizers and limestone and therefore are an added benefit. The breakdown of organic matter also releases some of these elements. In cases of certain deficiencies, foliar feeding is an excellent way to provide the needed elements. It can answer nutrient problems when plants are unable to absorb nutrients from the soil because of cold soil or root injuries. Foliar feeding also is good first-aid treatment for winter injury of evergreens.

Other Factors Affecting the Availability of Nutrients

1. Activation by water (nutrients dissolve and become available for absorption)

2. Soil temperature
3. Microbial activity (normally makes nutrients available; excessive activity temporarily ties up nutrients, especially nitrogen)
4. Organic content of soil
5. Physical state of soil (compacted, loose, clayey, sandy, etc.)
6. Chemical action of soil
7. Presence of lime—makes phosphorus more available
8. Presence of lime—makes potassium more efficient
9. Over-liming can result in rendering boron, copper, iron, manganese and zinc unavailable to the plant and also causes phosphorus to become less available. ♣

A Beef about Staking

Until a few years ago it was a standard practice to stake just about any newly planted tree. It seemed to make sense, at least for fairly good-sized specimens without a large, spreading root system, especially if they were to be placed in windy locations or along city streets. And it still does, but the practice has its limitations. According to research done at the University of California (Davis), trees that are very firmly staked for extended periods do not form the support roots that are essential for long-term stability on their own. Once the stakes are removed, the trees are more apt to topple in windstorms than their counterparts that have not been staked.

On the home property there is little point in staking a five-or-six-foot-tall tree, provided it has a good root system. The practice can be justified on a temporary basis for taller specimens, especially ones that have been grown in undersized containers, but even then the stakes should be removed after a year. It may simply be better to avoid purchasing such trees. In some instances cutting back the side branches by half (or removing every other side branch if there are a number), a method employed mainly with bare-rooted trees, will obviate the need to stake taller container-grown specimens. The chances are that these plants will be potbound anyway and will need to have their outer roots slashed before planting, so removing some top growth will not only lessen above-ground weight but compensate for root loss.

If staking seems essential, the ties should be at more than one point on the trunk so that the solitary point does not serve as a fulcrum for trunk break in a windstorm. Briefly, metal wire is preferable to rope, and it should be encased in a piece of old garden hose so it doesn't wear against the tree. One or three stakes are normally used, and the wire should be loose enough to "give" on a windy day. Periodic inspection is important because a surprising number of trees end up strangled or maimed by ties that forgetful owners have imposed on them.

A very windy area? Take a lead from the young replacement cypresses planted in exposed portions of the Monterey Peninsula in California. A wooden structure three or four feet tall, resembling two sides of a wooden packing box, is placed several feet to the windward side of the little trees and anchored to the soil. It affords some protection until the new Monterey cypresses can fend for themselves, and is probably better for them than stakes. ♣

Is it important to the gardener? . . .

WHAT'S WHAT WITH pH?

James Cross

Whatever you do, do not let this pH business mystify you! Rather, turn it to your advantage by making yourself aware of what the pH of your home soils is likely to be (see articles herein on acid and alkaline soils) and that you can determine a plant's preferences by observation and the help of reference lists such as the one that follows. It provides a rough guide to particular plants' preferences.

Why is this important to you? If you grow your plants in soils adjusted more nearly to their known preferences, it will result in healthier, more vigorous, and more attractive plants with less vulnerability to insect predators and disease. If you have found it difficult to grow a particular plant, one thing to do is to check the pH against the plant's known preferences. You may have much better luck by applying some ground dolomitic limestone (raise the pH) or by taking steps to make your soil more acid (lower the pH), whichever direction is indicated by your soil's existing pH.

For those a bit technically oriented, pH stands for *potential* hydrogen—the presence of hydrogen indicating, among other things, the relative absence of calcium (as in lime) and a more acid condition. The higher the number, the less free hydrogen is present (more *potential* hydrogen) and the “sweeter” (or less acid, more alkaline) the soil.

pH above 8: alkalinity is significant; can be a problem

pH of 8-6: area where acidity or alkalinity is modest; pH 7 is neutral, that is, neither acid nor alkaline

Pink ladyslipper (*Cypripedium acaule*) needs quite acid (pH 4-5) well-drained moist soil as well as light shade; not an easy plant to grow.

pH of 6-5: considerable acidity but still tolerated by a wide range of plants

pH of 5-4: very acid; can be a problem for all but acid-lovers of the Heath Family

The degree of acidity as measured by pH affects the plant's ability to take up the appropriate nutrients, and thus affects vigor and appearance.

Most soils range from near neutral to very acid. The exceptions with alkaline soils, found mostly in the American southwest, are almost always those with such modest rainfall that evaporation brings salts up to the soil surface.

Most fruit, vegetable, and ornamental plants have a reasonably wide tolerance to soil acidity before they get into noticeable trouble and do not function properly. Accordingly, the following pH numbers are suggested as a rough guide and are not to be taken as a source of worry if your tests show your soil pH to be slightly out of the preferred range.



George Toloumis

PLANT	PREFERRED pH
Most vegetable plants	6-7
Most lawn grasses	6-7
Most spring flowering bulbs (such as crocus, daffodils, tulips)	6-7
Most perennial flowers (such as clematis, daylilies, iris, chrysanthemums, phlox, violets)	6-7
Except:	
bleeding heart, Chinese, (<i>Dicentra spectabilis</i>)	5-6
butterfly-weed, (<i>Asclepias tuberosa</i>)	4-5
cactus, hardy prickly-pear, (<i>Opuntia humifusa</i>)	5-6
cinquefoil, wine-leaved, (<i>Potentilla tridentata</i>)	4-5
Iris, Japanese, (<i>Iris kaempferi</i>)	5-6
Jack-in-the-pulpit, (<i>Arisaema triphyllum</i>)	5-6
lady's slipper, pink, (<i>Cypripedium acaule</i>)	4-5
lily, Turk's-cap, (<i>Lilium superbum</i>)	5-6
lily-of-the-valley, (<i>Convallaria majalis</i>)	5-6
Oconee bells, (<i>Shortia galacifolia</i>)	5-6
phlox, creeping, (<i>Phlox stolonifera</i>)	5-6
pussytoes, common, (<i>Antennaria</i> sp.)	5-6
trillium, painted, (<i>Trillium undulatum</i>)	4-5
turtlehead, (<i>Chelone</i>)	5-6
violet, birdsfoot, (<i>Viola pedata</i>)	5-6
Most semi-woody ground covers (such as ajuga, pachysandra, honeysuckle)	6-7
Except:	
bearberry, (<i>Arctostaphylos uva-ursi</i>)	4-5
bunchberry, (<i>Cornus canadensis</i>)	4-5
ginger, wild, (<i>Asarum canadense</i>)	5-6
mountain cranberry, (<i>Vaccinium vitis-idaea minus</i>)	4-5
partridgeberry, (<i>Mitchella repens</i>)	5-6
trailing-arbutus, (<i>Epigaea repens</i>)	4-5
wintergreen, (<i>Gaultheria procumbens</i>)	5-6
Most woody vines (such as bittersweet (<i>Celastrus</i>), ivy (<i>Hedera</i>), trumpet (<i>Campsis</i>) or wisteria)	6-7
Most deciduous flowering shrubs (such as forsythia, lilac, roses)	6-7
Except	
blueberry, high or low bush, (<i>Vaccinium corymbosum</i> or <i>V. laevifolium</i>)	4-5
crape-myrtle, (<i>Lagerstroemia indica</i>)	5-6
summersweet, (<i>Clethra alnifolia</i>)	5-6

Franklinia alatomaha, a small, autumn-blooming tree, grows well in slightly acid (pH 5-6) soil.



George Tidonis

PLANT	PREFERRED pH
Most needled evergreen shrubs	5-6
(such as false-cypress, fir, spruce and pine)	
Except:	
juniper—most species, (<i>Juniperus</i>)	6-7
yew—most species, (<i>Taxus</i>)	6-7
Most broad-leaved evergreen shrubs	5-6
(such as azaleas, rhododendrons and holly)	
Except:	
boxwood—most species, (<i>Buxus</i>)	6-7
daphne—all hybrids, (<i>Daphne</i>)	6-7
holly-grape, Oregon, (<i>Mahonia</i>)	6-7
Most deciduous trees	6-7
(such as beech, dogwood, hawthorn, maples and sycamore)	
Except:	
birch—most species, (<i>Betula</i>)	5-6
chokeberry, (<i>Aronia</i>)	5-6
franklinia, (<i>Franklinia alatomaha</i>)	5-6
magnolia—most species, (<i>Magnolia</i>)	5-6
mountain ash, American, (<i>Sorbus americana</i>)	4-5
oaks—most species, (<i>Quercus</i>)	5-6
sourwood, (<i>Oxydendrum arboreum</i>)	5-6
Most needled evergreen trees	5-6
(such as fir, spruce, and pine)	
Except:	
arborvitae, American, (<i>Thuja occidentalis</i>)	6-7
cypress, bald, (<i>Taxodium distichum</i>)	6-7
Douglas fir, (<i>Pseudotsuga menziesii</i>)	6-7
Most annual flowers	
(such as impatiens, marigolds, petunias)	
Except:	
ageratum, (<i>Ageratum</i>)	5-6



Some plants require it . . .

ACID SOIL—A GOOD SITUATION

Don and Hazel Smith

Growing a wide range of healthy, beautiful plants, especially evergreens, requires soil that is somewhat acid. Those of us who garden in most areas east of the Mississippi River are fortunate in having this acid soil.

If your trees include oaks, pines and dogwoods, you can be reasonably sure your soil is acid, perhaps too much so.

Acid soils vary considerably in the degree of their acidity. Before you begin your gar-

Opposite, heaths (*Erica*) thrive in acid, well-drained, moist soil of low fertility. Hens-and-chicks (*Sempervivum*) can tolerate similar conditions but prefers drier, more alkaline soils.

dening you might submit a soil sample (small amounts of dry soil taken one to two inches below ground surface from several spots within the area to be cultivated then mixed together) to your county agricultural agent or to a garden center or laboratory having this service available. The results of this test will tell you the degree of acidity (the pH) and how to interpret the figure. You can also do your own soil testing inexpensively, with one of the kits that are sold in larger garden centers or by mail.

If your soil is alkaline (pH well above 7)

or neutral (pH a little below or above 7), it is possible to make it more acid and more to the liking of a wider range of plants by adding to your soil peat moss, pine needles or slow-to-decay leaves from deciduous trees. Once made more acid, each year remember to renew the acid humus to maintain the lower pH. A compost pile of partly decomposed leaves or pine needles is a big help in providing the loose-textured humus in which acid-loving plants thrive.

If you must rely upon chemicals to make and keep your soil acid, sulfur in the form of flowers of sulfur can be used; follow carefully the directions on the package. Aluminum sulphate is sometimes suggested but if you must use it, do so with great care for it is strong and can easily burn the roots.

It is generally easier to "sweeten" very



The turtlehead (*Chelone*) grows in acid, wet, part-shady spots such as streambanks or bog gardens.



Leatherleaf mahonia (*M. bealei*) need a somewhat acid soil (ph 6-7), as do other mahonias.

acid soils (raise the pH) than it is to make acid an alkaline soil (lower the pH)—another distinct advantage to those gardening in naturally acid soils. This “sweetening” is done most easily by adding ground dolomitic limestone, but one should first determine the quantity of limestone to be added and be aware that the effect may not take place for six months (or much longer, if pelletized forms of limestone are used).

Degrees of acidity vary, even within a single yard or garden. This can be affected by a variety of different factors including the proximity of plants to a cement foundation (in which there is considerable lime that can leach into the soil), the presence of cement scraps often buried in the backfilling of a new house, the nearness of a cemented patio or limestone rocks brought in for a rock garden. Even an abundance of earthworms can have the effect of raising the pH! According to botanist Edgar T. Wherry, this is why gardeners often have difficulty in keeping trailing-arbutus (*Epigaea repens*)

healthy in their garden. A loose, woody acid soil encourages colonies of earthworms whose castings are alkaline and, in time, can raise the pH of the soil from 4 to 7, causing trailing-arbutus to decline and eventually die. This, again, makes necessary the *annual* addition of acid humus in some form to maintain acidity for the numerous acid-lovers among the choice ornamental plants. Most pines, spruces, hollies, rhododendrons, azaleas and, in milder climates, camellias need some degree of acidity to reach their maximum potential—some even to survive. In contrast, junipers, yews, boxwood and many herbaceous perennials grow best in less acid soil, one nearer to a neutral pH of 7.

If you are not sure of the soil preferences of your plant, *check into it*. A brief list of soil pH preferences can be found on pages 44-5 of this Handbook, a lengthier one in *Hortus Third*, which should be available in your local library. The Sudbury soil testing kits also include a limited listing. 🍀

A problem mainly in drier areas . . .

ALKALINE SOILS

From an interview with Dr. Thomas Embleton,
University of California at Riverside

Most gardeners in this country will never be faced with the problems of planting in severely alkaline soils—those containing large amounts of calcium and sodium. There are a few isolated areas which have large surface deposits of calcium carbonate but, in most cases, alkalinity is found in arid sections of our country with annual rainfall of less than 25 inches. This rainfall is not sufficient to carry away the salts. Instead salts are concentrated in the top layers of soil as a result of evaporation of soil moisture.

If one is to successfully grow any real diversity of plants, methods must be devised for growing *around or above* these damaging salts. In developing such methods, be alerted to the possibility that the water supply itself may be so high in dissolved salts as to accentuate the problem.

Growing plants *above* the saline soils can be achieved with raised beds and/or containers filled with man-made soils frequently containing some synthetic materials. The extreme for those wishing to grow a wide variety of acid-loving plants with a minimum of trouble is to excavate the existing soil for several feet, replacing it on the bottom with 5-6 inches of gravel to assure good drainage and, above the gravel, with reconstituted soil heavy in acid-producing peats

or other slowly-decomposing organic matter. The regular use of acid-type fertilizers and supplementary organic matter will help retain the desired acid condition.

For making the most of existing alkaline soils, there are successful methods of planting and irrigating. These involve the use of carefully spaced furrows and locating the plants down from the crests of the mounds where salt concentrations are the heaviest. County extension agents working out of land grant colleges of the more arid regions should be able to furnish more specific recommendations on these special techniques.

A few simple, general rules should be remembered and carefully observed in working with solutions to the problems of very alkaline soils. First, special care is called for in assuring good drainage downward beneath any plants to be grown on alkaline soils; poor drainage will make even worse the problems of dealing with salinity. The second rule is that watering should always be heavy—enough to assure that any salts will be carried down and away from plant roots; frequent light waterings are to be avoided. It should be noted that excessive watering can lead to a chlorotic appearance with yellowing along the veins of leaves—due apparently to an iron deficiency. ❀



Raised beds, one solution to the problem of alkaline soils, lift plants above the salts in the native soil.

USDA/William A. Carathan

Some people mind it more than plants do . . .

LIVING WITH CLAY

Frederick McGourty

Gardeners grouse about a lot of things—the weather, the insects, the neighbor's greener grass. There is too much shade or too little, the pH is too high or too low. Yet the plants do grow, and at the end of the season the gains usually outnumber the losses by far.

One of the commonest grouses has to do with the soil. Sometimes it is sandy, and water and nutrients pass through like a sieve. Of course, it is a sieve because of all the open spaces between the large, gritty particles. Particles of coarse sand may be 1/50 to 1/12 inch across; fine sand is 1/500 to 1/250, medium is 1/250 to 1/50. By particle standards that's big.

Most sandy soils do not have particles nearly as large because they are not pure sand, but a combination of sand and other kinds of soil. Sandy soils dry out and warm up quickly in spring, and roots penetrate them easily. Great for carrots. And most plants need good drainage—to a point. However, to make these soils more retentive of moisture and nutrients, they need substantial and frequent amendments of compost or other decaying organic matter. If it is a small area, peat moss, one of the best soil conditioners, can be worked in, but it's expensive these days. Sandy soils also benefit especially from a mulch.

Particles of Difference

Compost helps clayey soil, too. True clay has soil particles which are less than 1/12,500 inch across. There isn't much air space between the particles, and roots have difficulty penetrating such a mass. Wet clay takes a long time to dry out, especially in spring, and when it does it has a hard, almost rocklike crust. Watering becomes quite difficult and runoff is common, but a good, porous mulch helps. Gardeners cry over this kind of soil. But clay retains nutrients well, and it doesn't need to be constantly watered in summer.

Fortunately, gardeners don't often have to deal with pure clay or pure coarse sand, though they may think that is their lot. There is a category in between, silt, in which the particles range in size from 1/12,500 to 1/500 inch. Most soils have varying degrees of silt. Loam, which represents a good garden soil, has 20 to 30 parts clay, 30 to 50 parts silt, and 30 to 50 parts sand. There are sandy loams and clay loams, as well as several other designations on the scale from sand to clay. In a strict sense they represent soil *texture*. Soil *structure*, on the other hand, refers to how the particles relate to each other, *e.g.*, if they produce a crumbly or friable soil (groups of particles, or aggregates) or compacted soil (particles crushed together).

If you are a new gardener with clayey soil, you may be tempted to add just sand after reading these remarks. Don't. Sand by itself added to clay equals cement, and that is not very good for plant roots. However, sand added with compost or other decomposed organic matter to a clayey soil is beneficial. The organic matter will gradually break down in the soil and must be replaced periodically if the structure of the soil is to be improved, so keep the compost heap active.

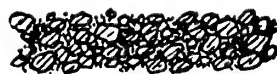
Treatment and Patience

Gypsum (calcium sulfate), which is available in most larger garden centers, is used to improve the structure of "heavy" soils and to make them more porous. Unlike lime, it does not raise soil pH, so gypsum is particularly appropriate for areas that are to be planted with rhododendrons and their shallow-rooted relatives that benefit from a light, airy soil. These areas, however, also should have an abundance of organic matter added.

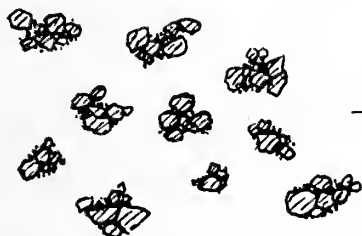
Spring takes a long time to come to the northern states, and there is a temptation to get out and work the soil in the garden on



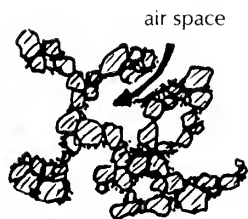
Soil particles not aggregated



Non-aggregated particles pack into solid mass



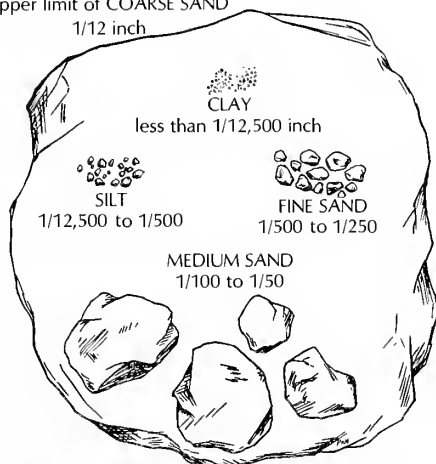
Soil particles aggregated into granules



Granules do not pack solidly together

Above, how soil structure affects packing of soil. The addition of organic matter improves soil aggregation.

Largest particle represents upper limit of COARSE SAND
1/12 inch



Particles of mineral matter in soil, shown magnified about 30 times.

the first nice day of March. If it's clayey soil, don't. Try the friability test first. Pick up a clod of soil, drop it from shoulder height and, if it doesn't crumble upon falling to the ground, go to Florida for two weeks. Walking on or digging in wet clay just compacts the soil further. If Florida is out of the question, spend your time raking

the remainder of last fall's leaves and starting a new compost heap. Your garden will thank you.

Want more detailed information? Consult the Brooklyn Botanic Garden *Handbook on Soils*, #20 in our series; also, *All About Fertilizers, Soils & Water* (Ortho Books, San Francisco). ♣



Be aware of...

THE DIFFERENT EFFECTS OF LIGHT IN YOUR GARDEN

Pamela Harper

Plants cannot live in the dark; light is essential, but not necessarily direct sunlight. Some plants prefer full sun; some do best in part shade; and some thrive with no direct sun at all. Where you live makes a difference. English gardening books stress the benefits of south- and west-facing walls, but English summers are cool and overcast, English winters mild; only in the Pacific Northwest of the United States are conditions at all similar. In the southeastern states, walls facing south and west have fewer advantages than those facing north and east. Be guided by local conditions.

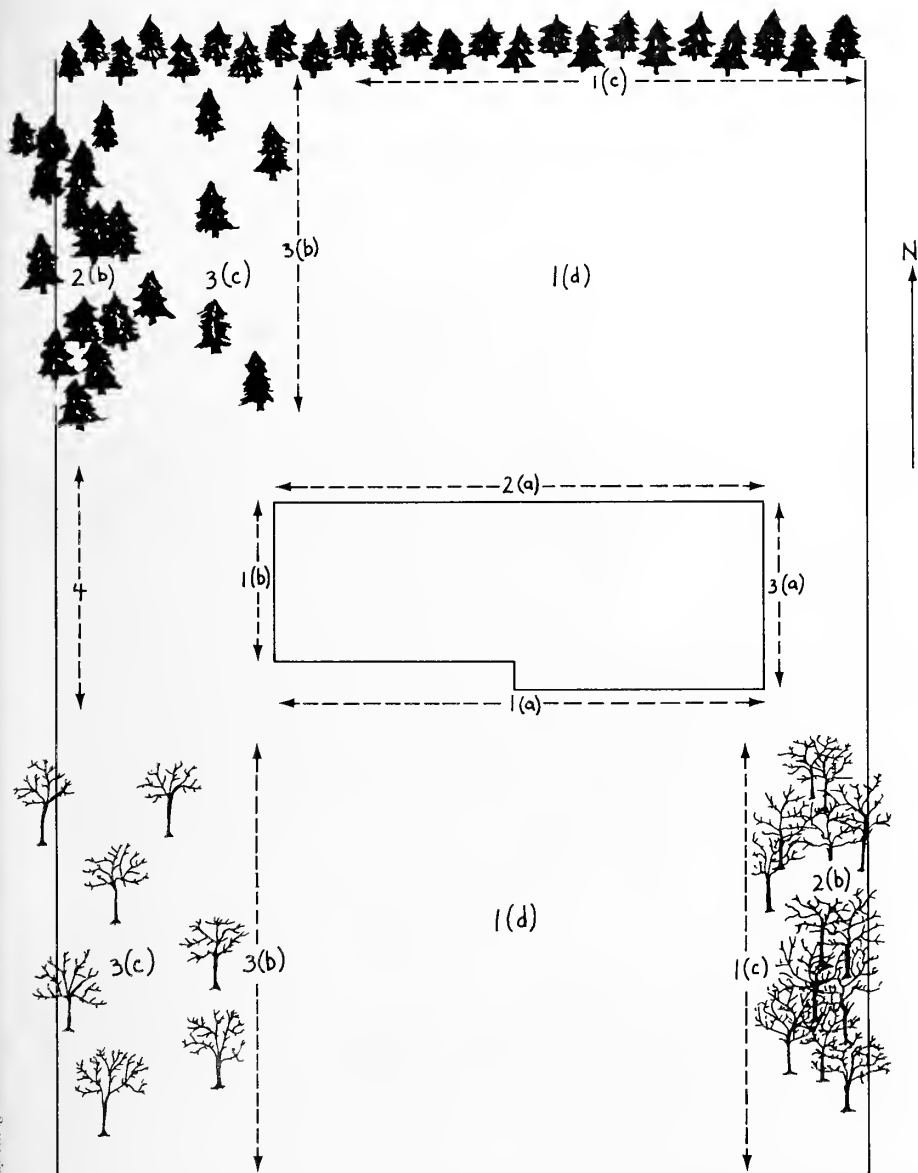
Gardening encyclopedias usually indicate a plant's preference for sun or shade, but all shaded or partly shaded sites are not alike. The accompanying plan shows types of sites most often encountered, their advantages and disadvantages.

Full Sun

(*Note:* Sites against walls may become very dry if there is roof overhang; watering may be needed.)

South-facing walls. Warm and protected from wind. Spring bulbs flower earliest, deciduous shrubs and perennials of marginal

Opposite, a full-sun bed has no root competition but is vulnerable to desiccation and damage from wind. Less vulnerable are the plants against the south wall of the house.



Various exposures possible on a property: 1(a) south-facing wall; 1(b) west-facing wall; 1(c) southern and western aspects backed by trees and large shrubs; 1(d) full sun away from trees or walls; 2(a) north-facing wall; 2(b) dense, dark

shade under low-branched, closely-planted trees; 3(a) east-facing wall; 3(b) eastern aspect against trees and shrubs; 3(c) dappled shade under widely-spaced, high-branched trees, 4 a chain-link fence.

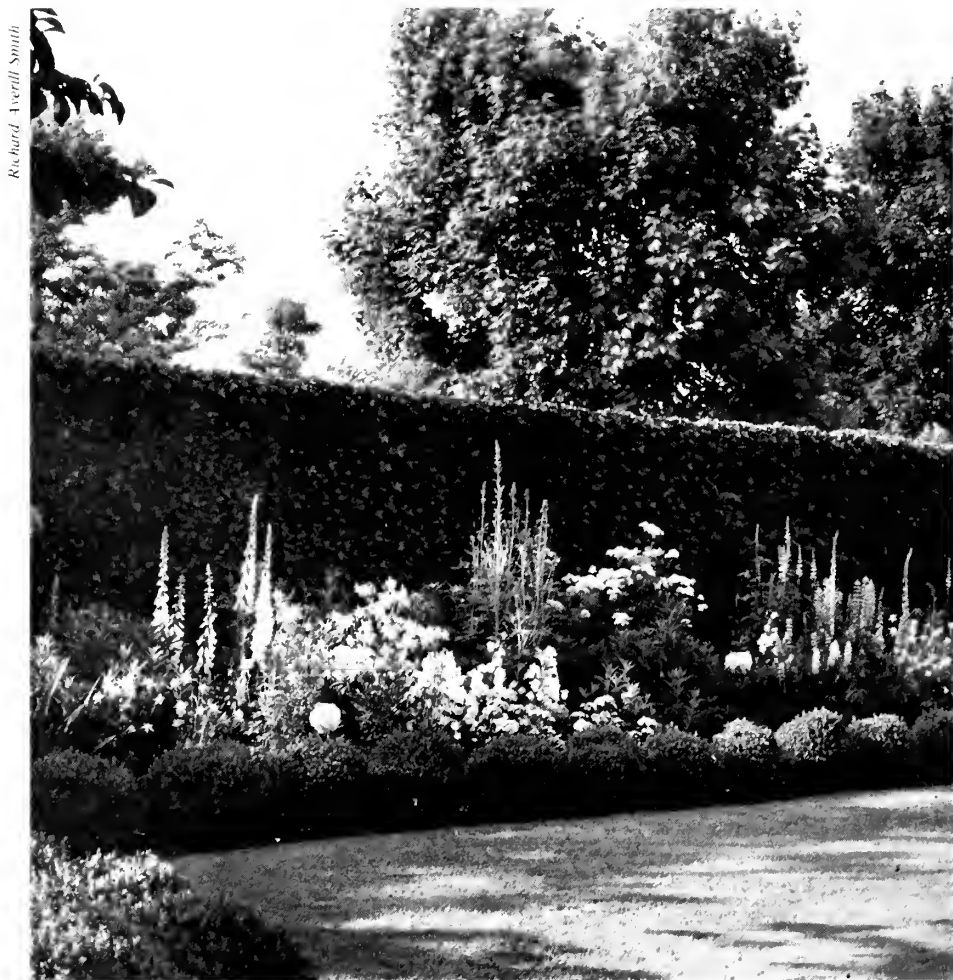
hardiness gain an extra measure of protection. Not good for evergreens where hot summers and cold winters prevail. Winter sun draws moisture from leaves when frozen roots cannot replace it, causing desiccation. Where winters are mild, this is a good site for such tender, sun-adapted evergreens as *Olearia*, *Cistus*, rosemary and *Raphiolepis*. The best site for cold frames.

West-facing walls. Morning shade, hot afternoon sun. Treat as full-sun site. A good place for evergreen azaleas in areas where summers are not excessively hot and late spring frosts occur, because frozen flowers

exposed to early morning sun are ruined.

Southern and western aspects backed by trees or large shrubs. Similar to the two previous sites, slightly less sun-baked (no walls to reflect heat), but with the disadvantage of root competition, so plants will need more watering, mulching, feeding.

Full sun away from trees and walls. No root competition. Wind exposed. On the plan a belt of evergreens and the house both provide protection from north winds. Excellent sites for vegetables, herbs, most perennials, most deciduous shrubs, fruit trees, most ornamental trees.



Richard Averill Smith

A southeast facing wall misses the hot afternoon sun, but evergreens may need winter protection.



Dappled-to-deep shade will provide a good environment for woodland wildflowers, ferns and primroses.

Full Shade

North-facing wall. No direct sun but ample light. In hot summer/cold winter areas a favorable site for hardy flowering evergreens. They may bloom less abundantly but will also be protected from foliage-burning winter sun and less susceptible to pests and disease. North winds may cause damage, however, unless deflected or filtered by a wall, hedge or shelter belt. Many ferns, hostas, hellebores, woodland wildflowers, English ivy, vinca and Boston-ivy would do well.

Dense, dark shade under low-branched, closely-planted trees. If the trees are evergreen, little can be grown under them. If deciduous, woodland wildflowers that bloom early then go dormant may do well, also ferns if root competition is not too severe.

Part Shade

East-facing walls. Morning sun, afternoon shade. Excellent for such hardy flowering evergreens as *Pieris*, *Skimmia*, *Camellia japonica*, rhododendrons and azaleas, ex-

cept in areas of late spring frost. All plants listed for part shade will do well.

Eastern aspect against trees or shrubs. Similar to east-facing walls, but with disadvantage of root competition.

Dappled shade under widely spaced, high-branched trees. If the trees are needle evergreens and deep-rooted, this is the perfect site for plants needing part shade. Deciduous trees are almost as good but provide less winter protection for evergreens. If the trees are surface-rooted, watering will be needed during dry spells. If the trees are low-branched (apple trees, perhaps), such bulbs and perennials as daffodils, primroses and hellebores will do well.

Light-facers

Remember that many flowers face towards the brightest light. Assuming that in the drawing (4) represents a chain-link fence, and that sun from the west is not blocked by a neighboring house, a row of daffodils here would turn their backs to you, as would climbing roses or clematis grown on the fence. ♣



The "hardy silk tree"—not necessarily so

A number of ways to increase . . .

WINTER PROTECTION FOR WOODY PLANTS

Harold Davidson

The winter environment often wreaks havoc on plants, especially those plants outside their hardiness zone. It can also have devastating effects periodically upon ones normally hardy in an area. Winter injury to well established trees and shrubs is most commonly manifested as: freezing, frost crack, desiccation, physical breakage and depredation by animals. Plants quite recently transplanted with insufficient time for new root growth to anchor them securely are vulnerable to damage from heaving out of the soil

and, in the case of taller trees and shrubs, from damage to new roots by the action on the top of the plant from strong winter winds. Although it may not be possible to totally eliminate winter damage to plants, it is possible to prevent some types and to minimize the degree of damage by other causes.

Freezing or Low-Temperature Injury

Low-temperature injury is most commonly associated with plants that are grown out-

side their hardiness zone. Gardeners frequently try to grow plants in areas north of their zone of hardiness. The results are almost always disappointing. Crape-myrtle and camellias are excellent plants in the South, but they are not dependably hardy in northern climates. In parts of the North the same is true of the hardy silk tree or "mimosa" (*Albizia julibrissin* 'Rosea'), a beautiful summer bloomer with pink flowers resembling powder-puffs. It was introduced by the Arnold Arboretum of Jamaica Plain, Massachusetts, in 1918 as a hardy plant from Korea. The tree is in fact hardy in parts of the Northeast. However, in East Lansing, Michigan, it grew well for seven years but died following a hard winter. Avoid this type of winter injury by planting only species known to be hardy in your area.

Another type of cold-temperature injury is freezing of flower buds or roots during a winter cold spell. Each species has a critical low temperature below which the flower buds are killed. Forsythia growing in gardens in colder parts of the North is often subject to this type of injury. In the spring,

flowers may be borne on only the lower 6 to 18 inches of these shrubs. This would be the result of a winter night when the temperatures dropped below -15°F , killing the flower buds that were exposed. The flower buds protected by an insulating blanket of snow would be undamaged and bloom in the spring.

It is not uncommon for container-grown plants, both in nurseries and landscaped areas, to die because the roots are killed by exposure to critically low temperatures. These vary according to the kind of plant. Some plants, such as holly, magnolia and dogwood, will suffer root injury at temperatures close to 20°F , whereas others, such as shrubby cinquefoil and white and Serbian spruce, can withstand root temperatures down to -10°F . This type of winter injury can be avoided by mulching the root balls heavily prior to the onset of winter. It is also wise to assure that the soil is saturated with water prior to freeze up, if nature is failing to provide enough rainfall. Temperatures will reach the lower, root-killing levels much sooner in dry soils.

Another cold-related problem is a late



A winter-damaged forsythia. The flower buds were blasted above the area where snow provided insulation.



Frost cracks (vertical scars) in a red maple. The widest is 2 inches; the longest is over 4 feet.

spring frost or, better stated, an early spring warmup. An early spring is greatly appreciated by people, but it results in premature growth and development of both flower buds and shoots. When the normal low temperatures return, the buds and shoots are injured. This type of injury is difficult to protect against, especially on large trees or extensive plantings; but selected small plants can be protected. The onset of growth can be delayed a few days to a week by preventing the sun's rays from reaching the plants. This is best accomplished by constructing a screen between the sun and the plants to be protected. The screen can be of any opaque material (burlap, canvas, evergreen boughs, etc.) that is available and appropriate to the site. The earliest flowering plants might best be planted in locations shaded from the sun's warmth so as to delay flowering.

Frost Crack

Frost crack, trunk split or "southwest disease" is commonly associated with small

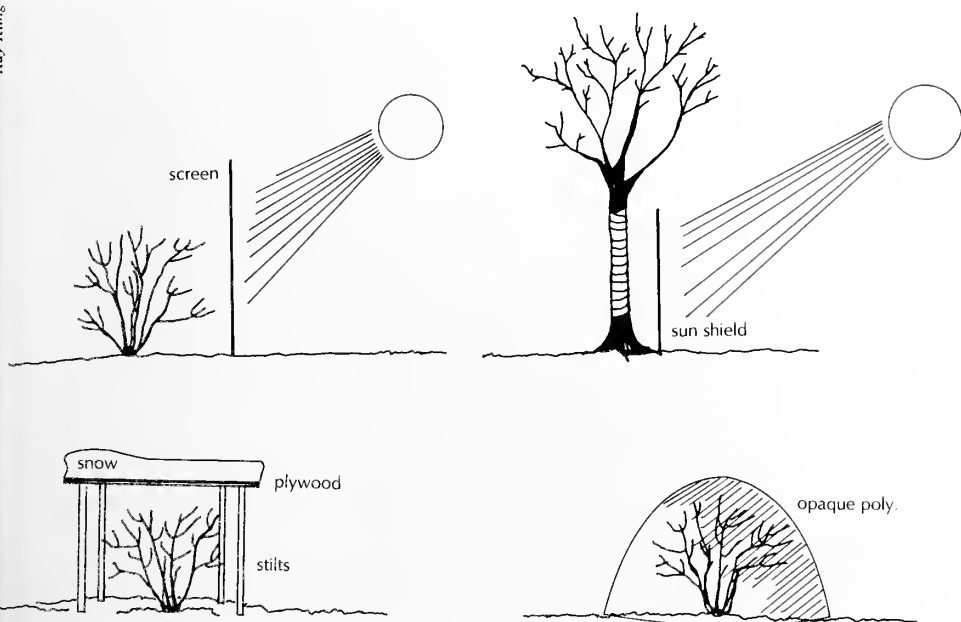
sized, thin-barked trees. Young maples are very prone to the problem, but it also occurs on other kinds of trees and sometimes on ones of considerable size. The trunk of the tree splits, as a rule on the southwest side, causing an unsightly wound that can vary from one to six feet in length and from a fraction of an inch to a couple of inches in width. The problem can be avoided by whitewashing the trunks, by shading and to some degree by wrapping. Whitewashing is used in orchards but not commonly in landscaped areas, for obvious reasons. Shading the trunks of trees is most effective, but all too often the screens are constructed too late or get knocked over. Wrapping the trunk with a commercial nonplastic sort of tree wrap is partially effective. Making sure that the trees are well watered prior to the onset of winter will often help to minimize the problem.

Desiccation

Desiccation, or drying out of the foliage, is a form of winter injury commonly associated with broad-leaved evergreens. It also occurs on narrow-leaved ones and on deciduous species, but there the probability of its occurrence is much less. Winter desiccation takes place on sunny days when the soil is frozen. Even though the air temperature may be low, leaf temperature is high, causing moisture to move out of the foliage. Since it cannot be replaced because the frozen soil prevents the roots from taking up water, the leaves desiccate. Snow drifting around evergreens in frozen soil can intensify the situation by extending the period of moisture stress and increasing the effect of the sunlight. This problem can be prevented by shading sensitive trees and shrubs such as American holly and rhododendrons before the end of the year. Even better, plant these within the winter-shade zone of a building, fence or large planting of hardy evergreens (typically the north or east side).



Evergreen boughs, gathered when trees are pruned or damage cleaned up, are useful as sunscreen or insulation.



Various barriers to provide winter protection against sun and snow damage for trees and shrubs.

Desiccation can also occur as a result of drifting salt spray from highway de-icing efforts. This type of injury can be avoided by planting salt-tolerant species such as Austrian pine or blue spruce. It can be minimized on sensitive species (white and red pine, arborvitae and yews) by constructing a barrier screen between the sensitive plants and the highways.

Breakage

A fourth type of winter injury is physical breakage from the weight of snow or rain freezing on the branches. When this occurs to large trees, it can sometimes ruin them. It can also be very costly if falling branches destroy property and break power lines.

Physical damage to small trees and shrubs can be prevented by taking appropriate action prior to the onset of winter. The damage to large trees, however, can only be minimized.

Small trees, shrubs and valuable hedge plantings such as boxwood, which has brittle branches, can be protected against damage from ice and snow by physically supporting



Rhododendron leaves damaged by desiccation (edges brown and curled).



Rhododendron leaves are very sensitive to warmth, unfurling as the sun reaches them on a winter morning. In an hour the whole shrub will have flattened leaves, by nightfall all will curl up again.



Boxwood (large) and azaleas (small) carefully wrapped in burlap to avoid desiccation and snow injury. The boxwoods, not usually hardy in Connecticut, have grown here fifty years, protected each winter.

the plants or by constructing a snow shield above the plants. Physical support may include staking, wrapping the plants with twine, or erecting a chicken-wire fence about the plant or along the sides of a hedge. Snow and ice shields can be constructed of any material that will prevent the snow or ice from breaking the plants. A piece of plywood set on stilts may be satisfactory in some situations; others may require a tent constructed of aluminum tubing and covered with opaque polyethylene. Remove when storm period is over. To keep on too long can cause desiccation injury.

The breakage of large tree limbs is most frequently caused by the weight of ice formed as water freezes onto the branches. Although there is no way to prevent the buildup of ice, the damage can be minimized by proper selection of tree or shrub for a given site, and by timely and proper pruning. Most trees damaged because of freezing rain have a decurrent growth form (elm, zelkova) and especially those with weak branch angles. Proper pruning when the tree is young can remove many weak, "V-shaped" crotches, thus reducing the potential for breakage

later. Trees with an excurrent form (those with a central leader), such as spruces and tulip trees, are seldom damaged during ice storms. Therefore, in areas that frequently experience ice storms, it may be desirable to plant mostly trees that have the excurrent form. When trees of the decurrent form are planted, they should be carefully selected or pruned to minimize the number of weak branch angles.

Animal Damage

The final area of winter injury is depredation by animals such as deer, rabbits and mice. During the winter these animals can do considerable harm. Deer damage is mostly browsing of evergreens (arborvitae, mountain-laurel, yews) and fruit trees. Rabbits gnaw the bark and cut the tops of young plants (crab apples, flowering dogwood). And mice chew the bark, girdling many trees and shrubs. They seem to prefer young crab apples but will chew on all types of plants, including pines, junipers and arborvitae.

Deer and rabbit damage can often be prevented by constructing barrier fences about



Salt hay around new rosebushes helps prevent desiccation and frost heaving.

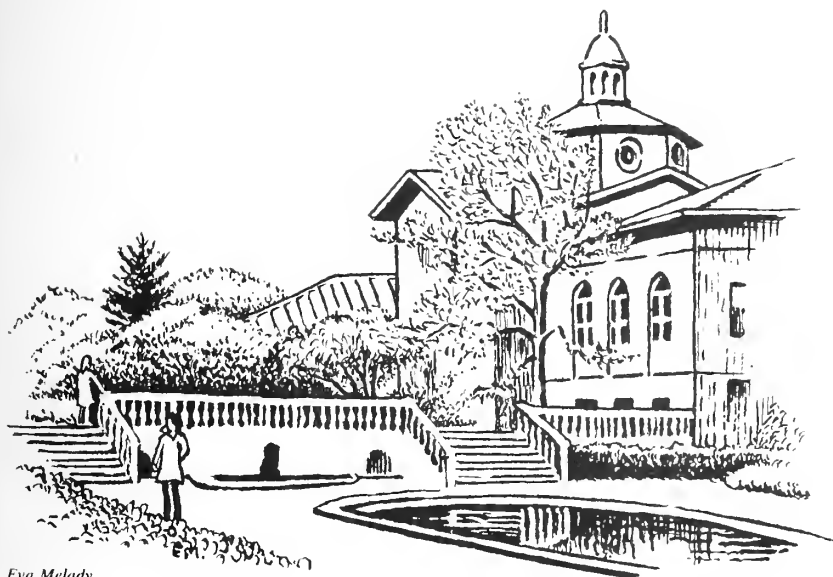
with a lot of wood exposed to widely fluctuating winter winds can suffer damage by the rocking action of the wind breaking off newly grown roots. Staking the tree in a secure manner before winter can eliminate the possibility of this.

Wrapping the trunks of newly planted trees is frequently recommended for their first winter in the new location as a means of diminishing the possibility of desiccation. The wrap should be removed at winter's end.

Winter damage to plants can be very costly. But in most cases, it can be avoided by selecting and planting trees and shrubs hardy in your area. When tender species are planted, they should be put into sites that will offer protection from the winter weather, especially from solar radiation in those areas where the ground freezes. Where tender plants are exposed to the elements during winter, it might be necessary to construct barriers to protect them from sun, snow, ice, freezing rain, wind, salt and animals. ❧

Other Handbooks in This Series

Planting and transplanting can be a fairly extensive subject even if one is interested mainly in the broader principles, but special plant groups have special needs. BBG manuals that may be especially helpful are #96 *Bulbs*, #92 *Roses* and #71 *Home Lawn Handbook*; also #85 *Container Gardening* and #86 *Ground Covers and Vines*. If you are just getting started with plants we suggest that you turn to #79 *Gardening Guide*. See the back cover of this Handbook for information on how to order. ❧



Eva Melady

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he plants it for posterity.**

—Alexander Smith

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Selecting, Growing, Propagating Herbs
Harvesting, Drying, Freezing
Favorites from BBG and
The National Arboretum



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BROOKLYN BOTANIC GARDEN RECORD

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No. 2

CULINARY HERBS

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An indoor herb garden in a sunny window can provide fresh seasonings year round.

LETTER FROM THE BROOKLYN BOTANIC GARDEN

Herbs are in again—as if they had ever been out. Some 24 years have passed since the last edition of the essential BBG *Handbook on Herbs*, though in the interim it was joined by separate manuals on *Herbs and Their Ornamental Uses* and *Japanese Herbs*. The latter two have had their share of readers over the years, but the basic culinary herbs are what seem to capture people's fancies the most. A generation ago tarragon was a strange word to a number of gardeners. This herb may not be as common now as chives and yoghurt (the sour cream of the 1980s), but it has made inroads in the salad dressing and elsewhere. Even garlic, the old butt of comic-book jokes, has gained acceptance west of the Hudson River, though one may not always serve it in North Dakota in the presence of Grandmother. And tabouleh, the bulgur wheat salad mix, with a full complement of chopped mint or parsley, has escaped the confines of the Middle Eastern neighborhood along Brooklyn's own Atlantic Avenue.

The country is richer for experimentation. Fortunately, ethnic diversity has put ol' ribeye and catsup on the run, and of late there has been a proliferation of "nationality" restaurants, whose distinction consists of the novel (to us) use of herbs. Most of them, especially the Japanese ones, are refreshing additions to the scene, though we know a few such establishments that the home governments ought to sue for defamation of culinary character. In addition, as trencherman-writer Calvin Trillin has pointed out, it is important to be suspicious of the term "continental," since one is never sure which continent is intended. Still, there is a general plus.

Freshly cut herbs, as well as unusual dried kinds, are increasingly evident in the supermarket, and there is clearly a rosy future for them among consumers. Sometimes, however, the fresh ones aren't always that fresh, and the dill you paid an arm and a leg for so you could serve it on carrots this evening turns out to be something else with no taste at all. Even in these relatively enlightened times, the produce manager may give you a sour look if you inquire about sorrel.

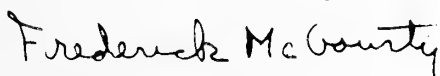
There is a pleasant way to circumvent the above problems, and that is of course to grow your own. The aim of the new BBG manual of culinary herbs is to give you the basic information on the best known kinds (and some which are not well known) and how to grow them in your own garden. Do not expect a recipe book; there are plenty of good ones around, and interest here is to get you started with these plants. It is a very warm pleasure to have the Botanic Garden's knowledgeable and astute Honorary Curator of Herbs, Elizabeth Remsen Van Brunt, who steered the earlier editions to completion, oversee this one, too. Many thanks to her and to her fellow Contributors who have made the new *Handbook* possible.

A personal choice? Lovage, an unusual one perhaps, and certainly to be challenged by wife, friends and colleagues. To be sure, space is needed for this six-foot-tall elegant sort of perennial celery with strongly aromatic, attractively cut foliage. It is a bold accent plant, one worthy of a spot in the sunny flower border. A leaf will perfume a stew, and two will make, with grated zucchini or cucumbers and chicken stock, a memorable soup. No freezer should be without fifteen quarts.

Last but not least, the Botanic Garden is indebted to the New York Unit of the Herb Society of America for a financial contribution to help offset the cost of the color insert which appears in the centerfold of this *Handbook*.

Happy gardening with herbs!

Sincerely,



Editor



The Herb Garden,
Berkshire Garden Center

How to start, what to include in...

THE BASIC CULINARY GARDEN

Mary and Scott Peddie

A small herb garden can be both a source of culinary delight and a thing of beauty. Even though most culinary herbs are not particularly attractive as individual plants, they can be combined, even in a small plot, to please the gardener's eye as well as his palate. My grandmother used to say, "Bread for my belly, but hyacinths for my soul." A well-designed herb garden will please both senses. In designing the garden one has a wide spectrum of colors, different foliage textures and distinctive growth patterns with which to

work. Herbs which do add much appreciated color are chives, garlic chives, sage, oregano and borage.

Then there are the graceful members of the Parsley Family (Umbelliferae) such as anise, dill and fennel. None are vividly colored, but they are attractive in the garden, useful in fresh arrangements and, when dried, are stand-bys for more permanent displays. Chives (*Allium schoenoprasum*) deserve a place in every garden, their grasslike clumps producing ten to twenty mauve bell-

shaped heads of flowers in spring. They are good for borders and as specimen plants in rock gardens. The white-flowered heads of garlic chives (*A. tuberosum*) do not dry as well as chives, but they have a unique beauty when they bloom in late summer. These are usually removed after flowering to prevent seeding, which can be a problem in a small garden. However, in larger areas it is often desirable to leave them, because the long-lasting scapes "swish-swish" in the autumn winds and become diamond-encrusted orbs in mid-winter.

Soil Improvement

Contrary to the oft repeated "Herbs do best in a poor soil," we find that they prefer a moderately rich, friable loam with good drainage and with more than the usual amounts of trace elements. However, helping a novice gardener acquire a "moderately rich, friable loam" is much like following the family recipe for spoonbread. "Half fill a bowl with cornmeal...a few eggs...and milk to the right consistency!" Amendments which improve the tilth of the soil include sand, perlite, peat moss, compost, gypsum (to loosen clay soils), well-rotted manure, peanut hulls—in fact anything that adds humus and improves soil structure. A good soil is to be cherished, and your herbs will appreciate it.

If you plan to grow herbs in containers, it is best to plant them in a "soilless" medium. These are not the same as potting soils available in many stores. Garden centers or nurseries will have such mediums available. Some brand names are Metro-Mix, Sunshine Mix, Redi-Earth and Pro-Mix. These soilless mediums are light in weight and nearly sterile. Read the list of ingredients, and if a slow-release fertilizer (e.g., Osmocote 14-14-14, three-month formulation) is not among them, incorporate it in the medium when you are ready to plant.

Perhaps the most satisfactory culinary herb garden is the raised bed, which ensures good drainage and is quick to warm up in spring, especially if it is in a sunny area, as it should be. A raised bed is also easier to tend than one at ground level because less stooping is involved. It can be made of brick, stone or cement block. Weathered railroad ties (not creosote-treated) are good, as are landscape timbers available at garden centers and lumber yards. Wood is easy to handle, comes in

many sizes, and is aesthetically pleasing. If good garden soil is unavailable to fill in the area, there is a reasonable alternative. Raised beds are particularly nice if a soilless type of growing medium is used. The quickest method is to buy several bales of growing medium, but a less expensive method is to make your own. For a bed 6'×6'×12' the following combination of ingredients works well:

- 4 bags (5.5 cubic feet each) peat moss
- 2 bags (6 cubic feet each) perlite
- 2 bags (6 cubic feet each) vermiculite
- 1 bag (50 lb.) ground agricultural lime
- 1 bag (50 lb.) composted, dehydrated manure
- 10 cubic feet of sand

Spread two inches of sand over the bottom of the bed, then add the components in layers. Mix well with a spade, soak thoroughly and let the bed rest for 24 hours. Mix again, adding a balanced fertilizer, and level carefully. Sow seeds or set out plants and stand back! This herb garden will quickly produce an abundance of herbs with very little work.

What To Sow or Plant

Seeds versus plants is always a question. It is thrilling to sow seeds and then watch as the tiny plants appear. But unless you plan to make a great quantity of sausage, you are not going to need all sixty potential plants of sage that a packet may contain! Some herbs are best started from cuttings or root divisions, seed for others is virtually impossible to find, and true French tarragon can only be propagated vegetatively. Plan to buy some plants from a local nursery, or order them from one of the many mail-order herb specialists.

A basic culinary herb garden should have basil, chives, dill, garlic, lemon balm, marjoram, oregano, parsley, one of the mints, rosemary, sage, savory and a thyme or two. If the garden is for a serious cook, then tarragon must be added to the list.

Basil, dill, marjoram, oregano, sage and savory may be sown directly in the garden. Chives come easily from seed, but a well-established plant or two is advised. These will provide immediate cuttings for the kitchen, while the grasslike seedlings are becoming established. Parsley is very slow to germinate so purchasing a few plants locally in spring is advisable.



Rosemary and pineapple sage make a pleasing contrast in foliage. Both are tender perennials and may be brought into the house for winter.

A mint is a must for every herb gardener, but certainly not in a raised bed. Mints are vigorous, invasive herbs and soon crowd out other plants. Plant them in a partially shaded area in soil which has enough humus to retain moisture well. An old-fashioned practice of planting mints near a water faucet was fine when water was piped out from the house. But now our faucets are located up against house walls, and the lime which leaches from the foundations of newer dwellings, as well as the lack of sunlight and air circulation, causes many mints to languish. If only a small amount of mint is desired, plant it in a container sunk in the soil almost to the rim, so the roots will be confined.

"Rosemary is for remembrance"—and for tea and lamb and many other fine foods. Except in the milder parts of the country where it is winter hardy, it is grown as a tender perennial, thriving outdoors in summer and brought indoors in autumn to be overwintered as a house plant. Rosemary is beautiful, fragrant and useful; every garden should have one! It requires only careful neglect;

that is, not too much water, time to grow, an open place with good drainage and gentle breezes. Container-grown rosemary plants need a thorough soaking at regular intervals. The prostrate variety is handsome as a cascade bonsai subject.

Here in Kentucky we find sage temperamental, in spite of its legendary long life. A number of problems, among them various diseases and root-destroying organisms, will suddenly attack a large plant. When grown in a raised bed in soilless medium, there is less chance of its demise. It is a wonderful gray-leaved, fragrant herb with many uses, but one well-established plant is enough for a basic culinary garden. Sage is quite ornamental in a perennial border.

Other Herbs

Both the annual summer savory and the perennial winter savory can be raised from seed. Summer savory grows and matures quickly, several sowings of a few seeds each providing cuttings for the kitchen all summer. The hardy winter savory is a durable

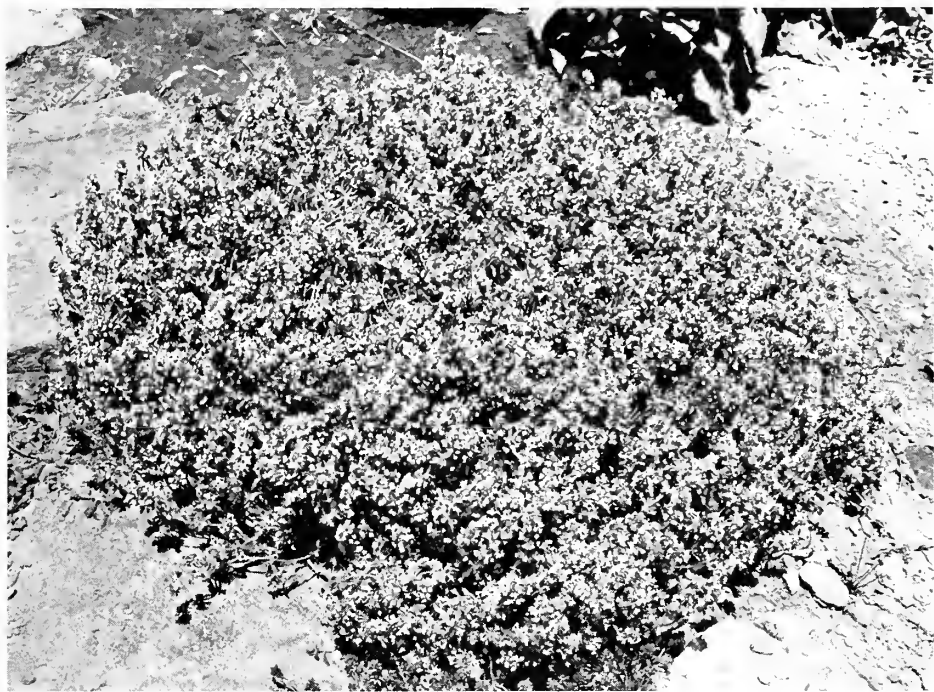
plant, and a dwarf cultivar is nice in containers or where space is at a premium. All savorys have the same sharp, peppery taste and go well with green beans. Two kinds of thyme seeds are generally available, winter thyme (*Thymus hyemalis*) and garden thyme (*T. vulgaris*). The latter is easier to germinate and yields the larger crop, but winter thyme is an interesting subshrub with small gray leaves.

True French tarragon (*Artemisia dracunculoides*) cannot be grown from seed. The tarragon seed which is often advertised produces a scraggly, weedy plant whose leaves have no flavor. True tarragon has such a distinctive and delightful taste that once you have begun to use it in the kitchen, you are an addict. Tarragon thrives in a moderately rich soil, but does require good drainage. It prefers full sun and yields best when well established. Tarragon plants should be divided every three or four years. Tarragon is excellent with chicken, in tartar sauce, and is a must in the *fines herbes* of French cuisine.

Unfortunately, a certain mystique has sur-

rounded the growing of herbs. Some gardeners seem to think it requires special knowledge and labor to have an herb garden. Actually one need not have superpowers or a green thumb. They respond effusively to a moderate amount of tender loving care. If you do not have the space or time for a new herb garden, do begin by tucking plants into flower beds and vegetable plots, or in an unusual container. One word of warning, however, once you have begun to use fresh herbs in the kitchen, nothing else will do!

There are many other unusual and different culinary herbs to grow and use. Among them are anise and caraway for their seeds (if you can save them from the depredation of ants), and coriander, both for its fresh foliage for Spanish and South American dishes and the seed for candies and pastries. Then there is the bay (*Laurus nobilis*) of historical fact and fiction, a handsome house plant and valuable herb; also salad burnet, grown for its appealing whorl of leaves and cucumber flavor. Let your culinary herb garden reflect your artistic ability, your ethnic background and your talent as a cook! ✂



Winter thyme (*T. hyemalis*) has a shrubbier habit than most thymes, which tend to creep.



For partial shade, mint is a good choice.

By careful choice you can grow a number of...

HERBS IN THE SHADE

A. P. Paterson

Herbs, we are usually told, are plants for the sun, and without it they languish and die. Why then offer a title of *Herbs in the Shade*? There are, perhaps, two main reasons why it is worth consideration. The first is that in any formally planned herb garden with beds in mirror image there are likely to be as many sites with a northern aspect as with a southern. The same plants do not necessarily succeed equally in each. Secondly, of course, herbs are often required to be grown in sunless gardens: the situation is not ideal and it would not be selected by choice, but if it is a question of that no herbs, then better shade.

Categories and Conditions

The range of plants which can be considered to be herbs is very great. Two clear categories immediately suggest themselves: the medicinal and drug plants, such as foxglove and lily-of-the-valley, which produce potent and potentially poisonous glycosides and alkaloids; and culinary herbs with their aromatic essential oils. It is unfortunate for the requirements of shady-spot herb growing that while there are many plants in the first category which are natural woodlanders and hence prefer shade, there are virtually none in the second group that do not choose sun

as long as adequate moisture is available. However, a third group of plants on the fringe of herbal use offers plants which happily accept change. If, like sweet woodruff, they can be used as a tisane, or like primrose and violets, provide flowers for crystallizing, then they are legitimate candidates for a culinary herb garden.

The majority of perennial aromatic herbs ranging from large shrubby sages and rosemary to tiny thymes and savories are natives of the Mediterranean area. The climatic factors to which they are adapted are well known and indeed those very aromatic qualities are one of their adaptations, presumably for defense from browsing animals, though anyone who has seen the grazed-flat hillsides and tasted local roast lamb or kid will know it is not wholly successful!

Nonetheless, throughout hot rainless summers in thin alkaline soil they survive, making their annual growth in late winter or early spring when moisture is still available. Where shade exists in, for example, high evergreen thickets (maquis), most of the same herbs grow, but they are taller, more open (if less "typical") in habit. Shade is obviously not an inhibitor as long as there is excellent drainage and reasonable light concentration.

In cultivation similar criteria apply, but while plants may grow without certain seeming essentials, such a lack can make them more vulnerable in other ways, for instance, lessened hardiness. At the Chelsea Physic Garden in London we found that in the light sandy soil, supported by a remarkably winter-mild microclimate, Mediterranean aromatic herbs succeeded wonderfully under a canopy of deciduous trees and shrubs. Root competition for available moisture mattered much less than it would have with many plants.

Again, in all-shaded sites many of the conventional herbs will succeed if the building also causes a rain shadow effect so that soil never lies wet. Any possibility of slow drainage must be countered by the addition of humus or coarse sand or both. A bed raised above surrounding areas is always relished by these plants in any situation, sun or shade. If sunny sites are available, however, obviously they will be planted there. This leaves the shady areas for a further range of culinary herbs which may well succeed better there than in full sun.

Mints

The mints are the classic recommendation, and certainly they take shade well. Dry shade, however, is not enjoyed by them or others in this second group of shade-accepters (which is not at all the same as shade-lovers, a relatively small number of hardy plants including virtually no culinary herbs). What this group requires is adequate summer moisture at the roots as well as atmospheric humidity if their leafy tops—their usual culinary provision—are to be maintained in good condition for a long season.

It is not always realized what a wide diversity of visual effect and of fresh scent the mints possess when the leaves are crushed in the hand and when used in cooking. Scent and taste are such personal experiences, so evocative of individual memories, that to recommend is almost pointless. As many as possible should be tried and one's own decisions made. The gray-leaved mints (based botanically on *Mentha villosa* and *M. x alopecurioides*) are useful visually, particularly when we remember that most gray-leaved plants need the sunniest spots. The vivid gold and green of ginger mint (*M. x gentilis* 'Variegata') and the white and green of pineapple mint (*M. suaveolens* 'Variegata') brighten dark corners. The purple-tinged bergamot or eau-de-cologne mint (*M. x piperita citrata*) provides a very different tone. It, to me, is the most delicious in the hand, quite wrong with peas or young lamb, yet good in the tiniest quantity with a salad or in an omelette *aux fines herbes*. The related bee balms (*Monarda*), especially those derived from *M. fistulosa*, will take similar conditions and provide floral height.

Parsley Relatives and Others

Several invaluable members of the Parsley Family (Umbelliferae) are happy with some shade. Parsley itself is also particularly keen on a moist atmosphere. Helped by shade, good leafy growth can be obtained from it throughout summer. It is almost impossible to have too much parsley, and several sowings should be made each year if one is really fond of it. Parsley also makes an admirable edging to beds. In spite of every statement to the contrary, I find the ornamental curled leaves just as tasty as the flat-leaved type.

Taller parsley relatives include fennel and



Coriander (*Coriandrum sativum*) grows to about 2 feet with finely-divided foliage.

angelica. The latter is one of the most ornamental of all herbs with its fine leaves and great green spheres of tiny white flowers. It is a biennial (though a freely self-sowing one), hence it needs care to maintain the effect where it is wanted.

Fennel is rather like an angelica whose leaves have been scissored into the finest lace, making a cloud of green or of bronze-purple, depending on the form. Reasonable moisture in at least half-shade encourages foliage at the expense of the not very exciting flat plates of yellow flowers.

Other parsley relatives used herbally for leaves, such as dill, chervil (sown late summer for winter use in mild areas), celery and coriander do equally well in the shade. If, however, coriander is grown for its seed (and who wants ratatouille without it?), this herb must have sun. Sweet cicely, too, is highly effective as an ornamental plant and has an occasional flavoring role. Plants grow three or four feet tall, and the leaves often become unattractive by midsummer. However, if the seeds are not required, the whole plant can be cut back sharply after flowering to en-

courage a bright green tuft of fernlike foliage for the rest of the season.

Both the common sorrel (*Rumex acetosa*) and French sorrel (*R. scutatus*) are happy in shade. The latter succeeds even in dry positions under trees. In such a spot it has to be replanted every so often, but this done, it provides good ground cover as well as succulent leaves for kitchen use.

Some of the onions, especially chives, are also shade-tolerant. Flowering may be reduced, but this is not important. Welsh or bunching onions, which are independent of floral fertilization for reproduction, are just as good. This is the basis upon which most herbs for shade can be selected. That factor taken into clear association with soil, the part of the country where you live, and the microclimate of your garden, should deal with most questions of "Will it or won't it grow?" Beyond this the answer is to try. Success frequently follows. ❧



The Welsh onion (*Allium fistulosum*) is a good allium for shade because it reproduces by offsets and does not need to produce many flowers.



Lovage, sages, apple mint, chives, parsley, salad burnet, sweet marjoram and lavender, ready to move.

Increase your gardening enjoyment with...

CONTAINER HERBS FOR WINDOWSILL OR TERRACE

Linda Yang

An Elizabethan knot garden may indeed be a joy, but it's strictly a dream if you live in an apartment or small house where acreage doesn't exist. But don't despair. Fresh herbs for the table can be yours simply by growing them in pots or tubs on a windowsill, balcony, patio, terrace or rooftop.

The secret is to make the most of your limited space and take full advantage of whatever sun you may have. Most herbs will be satisfied with at least five hours of direct sunlight daily. They may never win a prize,

but you can grow respectable rosemary, sage, thyme, chives, oregano, dill and coriander. If the growing area receives less than five hours each day but is not dark, you can still raise bay, parsley, tarragon, mint, basil, lemon balm and sweet cicely—and it's certainly worth experimenting with any others you enjoy.

Herbs can be grown in individual pots arranged on saucers on the floor or windowsill or in any other bright spot. Where space is minimal, by all means tuck several together

into the same pot or into containers with other plants including vegetables, flowers and even shrubs and trees. Tub-sharing is standard procedure on many big-city terraces.

Any spare container will serve as a home for herbs, provided there is a hole in the bottom for drainage. Wooden tubs are especially practical since they don't break when moved about and won't crack if left outdoors during cold winters. Because non-hardy herbs such as rosemary and bay also make attractive house plants, in cold climates select pots for these which will also be decorative when the plants are taken indoors in autumn.

Preparation and Care

Once you've chosen a container, prepare it for the plants by lining the bottom with half an inch of pebbles or broken crockery. I like to cover this with a sheet of newspaper to keep the soil from dribbling out, and then add the potting mix. Most culinary herbs are not particular in their needs, but when growing in containers they fare better in a potting medium which drains well. One ba-

sic soil "recipe" useful for many herbs consists of equal proportions of topsoil, perlite, composted cow manure and peat moss along with a generous trowelful of bone meal for each 12-inch tub or average-size window-box. If you use a commercial potting mixture instead, add extra perlite to ensure drainage. Fertilize container herbs every other week or so through the summer with a solution of fish emulsion diluted to half the strength recommended on the bottle.

If there is insufficient rain during summer hot spells, watering, for small tubs in particular, may be a daily chore. Not only do containers retain less moisture than soil, but if terra cotta pots are used there is also evaporation from the sides. Plants in very sunny or windy locations may require watering twice daily, especially toward summer's end when they have filled their pots with roots.

As the growing season progresses, you may well discover that the more herbs you cut and use, the more there will seem to be. That is the time to begin to dry or freeze some of the harvest in preparation for the lean days during the gray days of winter. ❧

St. Andrew's Day—29 November—Anoint
locks of doors and casements with garlic,
against vampires.

Ode to a Very Special Allium

Since things that here in order shall ensue,
Against all poysons have a secret power.
Peare, garlicke, reddish root, nuts, rape and rue—
But garlicke chiefe; for they that it devoure
May drinke, and care not who their drinke do brewe.
May walk in aires infected, every houre
Sith garlicke them hath power to save from death.
Bear with it though it makes unsavory breath,
And scorne not garlicke like to some that thinke
It only makes men winke, and drinke—and stinke!

*At the Medical School of Salerno, 1596.
A Rabelaisan verse written about garlic,
translated by Sir John Harrington*



Pennyroyal, pot marjoram, mint, thyme and basil drying.

Preparation for home use...

HARVESTING HERBS

Elizabeth B. Neavill

While herbs in a garden give aesthetic pleasure with their textures and subtle coloring, and are interesting for their lore and other associations, for many people the usefulness of these remarkable plants is their most important feature. When properly harvested, herb leaves, blossoms, roots and seeds can be used to enhance our diet, dye our fabrics, scent our belongings, decorate our homes and make our cosmetics. This article confines itself to the practical harvesting of culinary herbs.

Herb leaves can be harvested for immediate use, or they can be dried and stored for future needs. Among the so-called pot-herbs, whose young leaves are used fresh as a

cooked vegetable or in soup, we find borage, chervil, chicory, sweet cicely, dandelion, good King Henry, lovage, white mustard, orach, rampion and sorrel. Fresh-picked herb leaves used in salads or as garnishes come from a wide variety of plants besides the common parsley—anise, lemon balm, basil, borage, burnet, caraway, chervil, chicory, chives, sweet cicely, dandelion, dill, fennel, lovage, marjoram, mint, white mustard, nasturtium, rampion, pineapple sage, savory, sorrel, French tarragon and sweet woodruff. Many of the salad herbs, plus other fresh herb leaves such as horehound, oregano, rose geranium, rosemary and violet, plus violet blossoms and rose petals, can be

used in the preparation of teas, jellies, meats, vegetables, desserts and candies.

How To Go About It

Drying herb leaves may not be as easy as snipping off fresh ones just before dinner, but its rewards are extremely satisfying. The task requires speed, care and simple equipment. The goal is to harvest the leaves when they contain the optimum amount of essential oils, that is, oils that volatilize at room temperatures, on which the flavor of the herb depends, and to retain during the drying process the color of the fresh leaves. To accomplish this, herbs ideally are cut soon after the dew has evaporated on a fair day which has been preceded by two full days of sunshine. They should also be cut when the flower buds are just beginning to open, except for mint, which has the most oil in its leaves when in full bloom.

Since the essential oils are volatile, as little time as possible should elapse between cutting and the start of the drying process. The herbs should be collected quickly but gently in an open-weave basket. Stacking them, or stuffing them into plastic bags, generates heat and causes rapid deterioration. If you must travel some distance after harvesting, transport the herbs with their stems in water, never cutting more than can be conveniently dried at one time. A perennial herb may be cut back one- to two-thirds of its height, and an annual can be cut down to three or four inches. Get the harvest safely on the drying racks before taking time to shape the shorn plants for the additional growth that will produce a second harvest before September. The plants may be fertilized lightly with a nitrogenous fertilizer such as sulphate of ammonia to encourage the growth of new leaves.

Because time is literally of the essence in handling cut herbs, go through the washing process as quickly as you can. Cut away any undesirable material, and wash the herbs in warm water to remove all dirt or soil; never use cold or hot water. Three or four rinses are sometimes necessary. When they are clean, remove the herbs at once, then lay them on a bath towel and pat them gently dry. One innovative person I know lays the herbs lengthwise, not too many at a time, on a bath towel, folds each of its sides over the herbs, and picks up the towel at the ends to

lay it around the drum in the basket of her automatic washer. She then spins the load one or two minutes and opens the washer to find the herbs, still neatly enclosed by the towel, ready for the drying rack!

Drying

A clean dark well-ventilated room with an evenly warm temperature ranging from 70-90°F should be readied to house the herbs for drying. A dark air-conditioned room is ideal, and next best is an attic room whose windows may be closed at night. Racks with wood frames covered with muslin, cheesecloth or nylon net, or metal window screens with muslin or cheesecloth laid on top, should also be in readiness.

After they are washed, the leaves of basil, celery, dill, lemon balm, lemon-verbena, lovage, mint, parsley, sage and French tarragon are stripped by hand from their stems and placed in a single layer on each rack. Label each rack with the name of its herb to avoid confusion when dry. Racks should be elevated so air can circulate under and around them. Racks can be elevated from a table top by stacking books under two sides, or they can rest on the arms of chairs, or on the horizontal backs of two chairs. More professionally, they can slide into a frame especially constructed for them, with a space of at least one foot between racks.

Unlike the herbs with larger leaves, marjoram, oregano, rosemary, the savories and the thymes are dried first and then stripped. The stripping must be done with care and with clean dry fingers. One authority suggests wearing a glove on the stripping hand. For successful storing, be sure that all stems are removed when stripping small-leaved herbs.

Under normal circumstances herbs dry in three or four days, particularly if they are turned daily. In humid weather drying takes longer, and crisping is necessary as a final step. Herbs spread sparsely on a cookie sheet and placed in an oven at 125°F will become crisp and ready for immediate storage in a few minutes.

Glass jars with screw tops will keep the dried herb leaves airtight until you wish to use them, summery-green and fragrant, on a cold and snowy day. Dried herb leaves are three times stronger than fresh ones, and this must be taken into account when they

are used. When dried in the manner described, their flavor will be excellent for at least a year. Dried leaves stored whole retain their flavor longer than those stored rubbed, powdered or made into a mix with the blender.

Though chives can be dehydrated commercially by refrigeration, they do not dry satisfactorily in the home. However they, like parsley, can be frozen.

Herbs can also dry tied in small bunches and hung from cords strung in the drying room or attic. This method takes about a week. As soon as they are dry, they should be stored bunched, stripped or powdered in tightly covered jars. The results will be less satisfactory than with the screen method.

Blossoms and Roots

Fresh herb blossoms such as those of borage on a cake and nasturtiums in a salad, can be attractive as decorations. Chamomile flowers, the yellow centers of which contain the essential oil, can be used fresh or dried for tea, and chive blossoms just starting to open make beautiful vinegar. The flowers of calendula, snipped from their stems just before the last of them open, then dried well, are desirable fresh or dried in salads, soups and stews. Dried and stored in the same manner as herb leaves, herb blossoms are harvested in most cases at the moment when they have just come into full bloom. Fresh violets may also be candied at this time, and rose petals made into rose honey and rose syrup.

Herb roots for harvesting are dug in the spring or fall when the plant is inactive, at which time they are fullest of flavor and will

not shrink. They should be scraped and hosed until clean, and if they are to be dried, the larger pieces sliced for uniformity of size and laid on the racks in the drying room for about six weeks. They should be turned over twice weekly and, if necessary, crisped in the oven, exactly as the herb leaves were, before going into airtight storage. A root is considered dry when it can be snapped smartly in two by the fingers. The roots of sweet flag, which are more tender in the spring, and of lovage can be candied fresh. Skirret root, to be boiled and eaten as a vegetable during the winter, may be stored in sand or left in the ground until needed. Roots of angelica, sweet cicely, elecampane and fennel are dried for candies, beverages and flavorings. The most widely used herb roots are the universal favorites, onions, garlic and shallots. A rope of braided dried onions hanging in the pantry at summer's end is a pleasant sight.

Seeds

The seed heads of anise, caraway, coriander, black cumin, dill, fennel, mustard and sesame are harvested when their stalks are dry and their seeds ripe. The heads, including a very short stem, are cut into a paper-lined basket, then spread in the drying room for five or six days, at which time the seeds can be loosened gently from their pods or stems. Remove the chaff and leave the seeds on the rack for another week or ten days, turning them often. Seeds, like all dried herb materials, are stored in airtight jars of a proper size in readiness for all kinds of culinary treats from soup to cake. ❧

Herb or Erb?

A simple four-letter word, *h-e-r-b* has been the cause of much discussion as to its pronunciation. In America one is often considered uncultured if he pronounces the *h*; in England he is apt to be branded a cockney if he drops the *h*.

Until 1475 the word was *erb*, both in spelling and in pronunciation. It came to England from the Latin *herba*, through the Old French *herbe* or *erbe*. At the beginning of the sixteenth century, the Latin *h* was re-attached to the word, but it remained mute until 1800. Since then pronunciation of the *h* has come into use; *herb* is correct in England. American usage still clings to the historical *erb*. Take your choice. When in London, say *herb*, when in New York say *erb*; when in Rome. . . . ❧

From its curator here are some . . .

FAVORITES FROM THE NATIONAL ARBORETUM'S HERB GARDEN

Holly Harmar Shimizu

Using culinary herbs makes cooking a pleasure and puts challenge and creativity into the art of preparing food. Experimenting with different ones increases enthusiasm for cooking. The growing and using of herbs are not passing fads but practices that have been going on for centuries, ones that no doubt will increase as more information becomes available to the general public. The recent development of the National Herb Garden at the U.S. National Arboretum in Washington, D.C., will attest to this. Visitor interest there is very high, classes are always full and requests for information constant.

There are no strict limits to the use of herbs. However, until you are confident of how a certain herb is best used in cooking, it is suggested that you mix the herb, fresh or dried, with butter or cream cheese and sample it on bread. Once you are familiar with that flavor alone, finding interesting suitable combinations will come naturally. Although fresh herbs are not as concentrated as dry herbs, they are often preferred by cooks since the taste is better.

When I first started experimenting with herbs in the kitchen, I added so many different kinds that the food's natural flavor was completely disguised! I have since learned to be more subtle and use my herbs selectively. A general rule is not to mix two very strong herbs together, but rather to mix one strong and one or more milder flavors to complement the stronger herb along with, of course, the food. For this article I have selected ten of my favorites from the National Herb Garden. All are usually available as plants or seed, although some may have to be ordered from nurseries through the mail.

Garlic and Top Onion

Garlic (*Allium sativum*) is foremost on my list. It is best known as a potent seasoning in French, Chinese and Italian cuisine. In salads, a clove may be rubbed simply in the salad bowl to give its flavor. In cooking, some

people remove garlic from food before serving, others leave it. Garlic is commonly added to soups, sauces, dressings, meats, fish, pickles and curries. In addition, it is popular for flavoring butter, oil, vinegar and mayonnaise.

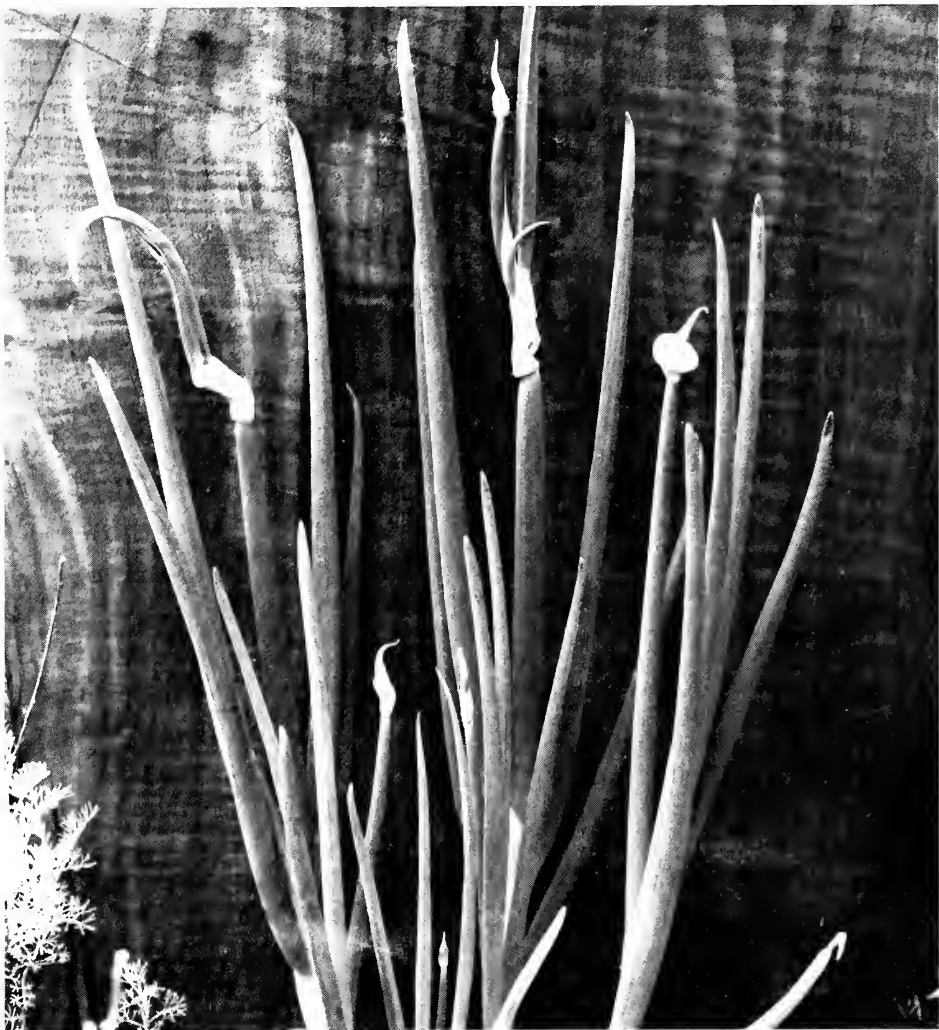
Requirements for growing garlic are full sun and rich, well-drained soil. Propagation is best by bulblets which should be planted in fall. New bulbs which have formed and are ready for harvest should be dried for one week and then may be trimmed, braided and hung in a cool, dry place.

A plant which always arouses comment in the National Herb Garden is the top onion (*Allium cepa* var. *viviparum*) because of its odd shape. On top of the 2- to 3-foot tubular scape (stem) a crown of small brown bulbils is formed. As the bulbils develop and get heavier, the scape falls to the ground, where bulbils begin to grow, thus forming new plants. The underground bulbs do not develop well; they are hardly thicker than the base of the stem. Despite their small size they are very flavorful and may be eaten in the same way as spring onions.

The bulbils of the top onion add onion flavor to hot dishes, to salads, and are especially good when pickled. One favorite treatment is to mix the bulbils in wine vinegar with white peppercorns, then heat for several minutes. Drain and set them into a jar, making layers with French tarragon and horseradish. Add the cooled vinegar over the layers and seal the jar. They make a delicious hors d'oeuvre.

Geranium, Perilla, Holy Basil

Many visitors are surprised to see the rose-scented geranium (*Pelargonium graveolens*) in the culinary herb garden. In my opinion its flavor and fragrance supersede the two-hundred-plus other kinds of scented geraniums. Just a slight brush of the leaf and the delicious rose scent permeates the air. Originally from South Africa, this lovely plant is very easy to grow, its main requirements be-



Toponion (*Allium cepa* var. *viviparum*) develops bulblets at the tops of the stems. In time they bend over, touch ground and take root.

ing full sun and good drainage. Keeping it cut back through the summer will give a full, compact plant. In order to hold it through the winter in areas with hard frost, plants should be dug in late fall and taken indoors for protection. Otherwise cuttings should be taken in late summer to grow for next year's garden.

Rose geranium leaves are used to flavor cakes and baked products. Whole leaves are placed on the bottom of the baking pan and then batter is added. During baking the flavor of the leaves will be absorbed by the cake and the leaves will leave their pattern on top

of the cake. Another favorite culinary use of the rose geranium is to make jelly from leaves. It is made like other jellies except apple juice is added to yield a combination of apple and rose flavors. The chopped leaves are also added to sweeten fruit dishes and drinks, and even to make a delightful tea.

Also used as a tea are the leaves of purple perilla (*Perilla frutescens* 'Atropurpurea'). Although it is sometimes called weedy, purple perilla is a valuable garden plant both for its attractive dark purple foliage and its many culinary uses. Purple perilla is sometimes confused with 'Dark Opal' basil because of



their similarity in foliage color. Actually, purple perilla is easy to recognize with its large, coarse leaves, which give it a much rougher texture than 'Dark Opal' basil, which has satiny smooth foliage. Purple perilla is a tender annual reaching a height of two to three feet. Although it self-sows prolifically, it is easily controlled by either cutting off the spikes of flowers as they fade or cultivating the surrounding soil in the succeeding spring to prevent seedling growth.

The uses of purple perilla are many. In Japan the leaves are an ingredient in mume (pickled Japanese plum) tea. They give dark red color to this tea, which is highly regarded as a medicine in that country and thought to be a cure against body parasites. The leaves are also dried and used as a flavoring in rice, adding a taste reminiscent of anise. Flowers are used to make an unusual tempura. Cut young flower spikes of purple perilla are dipped in tempura batter and deep fried. Young flowers tend to be less stringy and

Chicory (*Cichorium intybus*) is known for its sky-blue flowers. The roots are ground and mixed with coffee to supplement and enhance the taste.

more flavorful. Flowers are added occasionally to soups as a seasoning. Also, young seedlings are used as a flavoring on raw fish.

An herb becoming increasingly popular is holy basil (*Ocimum sanctum*). In the United States it is often confused with spice basil, which is actually a hybrid (possibly of *Ocimum canum* x *Ocimum basilicum*). In India, though, spice basil has been accepted as a holy basil because of its distinctive odor. True holy basil is also called *Sri tulsi* and *Krishnatulsi* in India. Holy basil is revered by Hindus and planted around temples. Cultivated in the warm regions of the Old World, it is a bushy perennial subshrub reaching a height of two feet. In cooler climates holy basil, like other basil, is grown as a tender annual. There is also a purple-leaved form of holy basil.

Holy basil's fragrance is similar to sweet cloves and is slightly intoxicating. Fresh leaves are added to salads for a sweet anise-like flavor. Fresh or dried leaves or even flower tops add tremendous taste to meats, especially chicken. Holy basil blends well with hot, spicy foods to give an almost cooling effect.

Chervil, Sweet Cicely, Lemon Grass

Imagine a piquant flavor somewhere between anise and tarragon. That describes the flavor of the leaves of chervil (*Anthriscus cerefolium*), which especially complements vegetable and egg dishes. It is an unusual garnish for pork, veal or beef. Chervil soup is quite delicious, as are chervil butter sauces. Chervil is very important in French cooking, being one of the traditional herbs used in the *fines herbes* mixture, which accounts for its synonymous common name, French parsley.

Chervil, which in fact resembles parsley in many ways, is a hardy, shade-loving annual that is not particular about soil. It is propagated by seed. Often grown in containers or window boxes, chervil can provide fresh leaves throughout the winter. Like most herbs it will fill out if cut back properly. The small white flowers, which form when plants are about eight weeks old, should be removed to encourage more leaf growth. If not cut

back, the flowers are quickly succeeded by slender black seeds. Chervil grows best in spring or fall, tending to languish or die in hot, humid weather.

An herb with flavor similar to chervil but slightly sweeter is sweet cicely (*Myrrhis odorata*). Also referred to as sweet chervil, its anise flavor is so sweet that it may be used as a sugar substitute. Fresh leaves sweeten jams and tart fruit dishes. Finely chopped foliage enhances salads, salad dressings, vegetables (especially carrots), omelettes, pancakes and fish. The large taproots may be boiled and eaten with a vinaigrette sauce or candied. Commercially the seeds are used for their anise flavor in production of Chartreuse liqueur.

Not surprisingly its botanical name relates to its aniseed aroma, *Myrrhis* meaning perfume and *odorata* meaning fragrant. Along with great flavor and fragrance, sweet cicely is a most attractive herb, its young shoots appearing in early spring and uncurling into lovely ferny foliage. Soon white flower clusters appear from the center of the plant followed by shiny black seeds. Plants, which become large, need partial shade and an



George Tabounis

Sweet cicely (*Myrrhis odorata*) grows to three feet with fernlike foliage that has an anise scent. The stems are often candied.



The rose geranium (*Pelargonium graveolens*) is extremely pungent. It should be sheared back for a denser plant and brought indoors in hard-frost areas.

acid, moist soil. Propagation is by seed and by dividing the taproot into sections containing an eye. Sweet cicely requires a cool winter for its dormancy.

On the contrary, lemon grass (*Cymbopogon citratus*) likes the heat of the summer, thriving in hot tropical conditions. I am very selective about the tender herbs I will carry through the winter in the greenhouse, since space is limited, but lemon grass is one which deserves a place. Being a member of the Grass Family, the long-bladed clumps contrast with the textures of other herbs. The leaves, which grow from a bulbous base, are erect, to a height of roughly three feet, with a pleasant lemon scent. Lemon grass is unknown in the wild, although it is cultivated widely in the warmer regions of the world. Plants thrive in moist, ordinary garden soil with full sun and are easily propagated by division. It makes a good greenhouse or pot plant, benefiting from occasional use of a liquid fertilizer.

The leaves of lemon grass make a superb tea, often being used in combination with other tea blends. An essential oil is derived from the leaves and stems by steam distillation. This oil is important in cosmetic preparations, medicine and as a lemon flavoring. Since the oil is less expensive than other lemon oils, it is often used as a substitute.

Some Others

Many herbs, such as horseradish (*Armoracia rusticana*), are cultivated for their useful roots. Horseradish is best known for its use in hot sauce on roast beef and as an addition to catsup as a sauce for shrimp. As a garden plant it is best suited to the background, since it grows quite large, has a coarse texture and is invasive. Moreover, to harvest this plant the roots must be dug up. A vigorous, hardy perennial, its above and below ground parts reach lengths over three feet each. The roots, which emit a strong odor when bruised, can be eaten freshly grated as a condiment on many sorts of meats. They are dug in the fall, since that is when they contain the most flavor, and may be stored in cool, moist sand until needed. The roots may also be grated, mixed with a little vinegar and frozen. They are best used uncooked, as flavor is lost during heating. Grated into a sauce, the horseradish roots are added to salad dressings and fish. During summer

young leaves make a fine salad green. In Gerard's *Herball* he wrote, "Horseradish stamped with a little vinegar put thereto, is commonly used among the Germanes for sauce to eate fish with, and sauce-like meats as we do mustarde; but this kind of sauce doth heate the stomacke better, and causeth better digestion than mustarde."

Also cultivated for its roots and leaves is chicory or Belgian endive (*Cichorium intybus*). This plant is most likely already familiar to you since it thrives along roadsides, displaying its beautiful azure flowers in summer. It has been cultivated since Roman times as a vegetable and salad plant. Linnaeus referred to chicory as a floral clock because the blossoms open and close with the time of day.

Chicory is a hardy perennial preferring light, rich and well-drained soil. It is grown in different ways depending on how it will be used. Roots, when roasted, are a common substitute or adulterant for coffee, especially in France, while young green leaves are a desired salad green. Blanched young shoots are popular for salad. It is fairly simple to produce blanched heads of chicory. Dig the roots in the fall and plant vertically in deep boxes with soil, sand or similar medium between the roots. Then cover with pots, boxes or a light mulch to prevent light from getting in. Heads may be harvested in three to five weeks depending on temperature. Blanched leaves are extremely popular in Europe, the majority being cultivated in Belgium, hence the name Belgian endive.

The herbs discussed are a mere sampling of the rich palette of plants available to us. In planting a garden, even a landscape garden, I always feel combining beauty with usefulness gives double pleasure. Herbs then, particularly those with a culinary use, give infinite pleasure because their usefulness is unlimited. American nurserymen now report that sales of herbs are better than ever. Perhaps this is due in part to our new interest in good food, especially ethnic foods. Growing and using herbs adds new dimensions to our lives, not only through enhancing sweet and savory delights but through gardening, one of our most healthful hobbies. As Gerard wrote: "Talke of perfect happinesse or pleasure, and what place was so fit for that as the garden place where Adam was sent to be the Herbalist." ❧



The Herb Knot Garden, Brooklyn Botanic Garden

From the gardener who tends them...

FAVORITES IN THE BBG HERB GARDEN

Bernard Currid

The ten kitchen herbs I like the best? That's a difficult question because there are so many good ones, ones that give both garden worth and pleasure on the table. At the risk of inflating the list I will include a few aesthetically pleasing companion plants for the top ten! They also happen to be good kitchen herbs in their own right.

Basil 'Dark Opal', which has maroon foliage, is my first choice, a fine annual herb for seasoning and as an ornamental. Given sun and good drainage, which are the requirements of most herbs, it is an easy plant to grow, even as a winter foliage plant on the windowsill or under artificial lights. Young plants can be purchased in trays from garden centers in spring, or started indoors from seed six to eight weeks before they are set out in the garden once the danger of frost has passed. Frequent pinching of new shoots keeps plants compact and thrifty. Remove flower stalks as they form. Harvest leaves

anytime, drying them or keeping them refrigerated.

A pleasing companion in the garden for basil 'Dark Opal'? I like to interplant it with salad burnet, which is a low-growing perennial herb with attractively cut foliage that has a light texture. Bear in mind that this purple basil is a handsome plant and holds up well in a flower border, especially when displayed with silver-leaved plants such as the dusty millers.

My second choice is caraway. I have a great affection for this herb of the Old Country. It is one of the first herbs I enjoyed as a child in my native northwestern Ireland. I remember tenderly, on special occasions, that the treat of the day was Irish soda bread to which was added a generous helping of caraway seeds and raisins.

Caraway, which has finely divided leaves much like a carrot, is a biennial which self-sows readily in the garden but not to the



Caraway (*Carum carvi*) is sometimes used in Irish soda bread.

the most attractive of all kitchen herbs. When the flowers fade I cut the plants back to the ground to encourage the growth of new leaves, which will eventually be snipped for use in salads or with sour cream for baked potato topping.

There is a way to encourage even better flowering. In the Herb Garden at the Brooklyn Botanic Garden sometimes I have grown chives by planting single bulbs in spring, six inches apart and three inches deep, instead of transplanting small clumps, which is the usual method. The bulbs are kept well watered during summer. By the following spring there are healthy clumps with some very showy flowers. I therefore like to divide the chives bed in half, replanting a portion every other year.

Chives also grow well on a sunny windowsill or under lights. Grow several clumps and harvest one at a time, for this ensures a continued supply of soft fresh leaves.

Bay or true laurel (*Laurus nobilis*) is another herb of which I am very fond. In my own garden I grow this evergreen nonhardy shrub in the filtered light provided by fennel and dill plants. The bay is then brought into

point of being a nuisance. The foliage is particularly attractive in early spring of the second year. Plants do not seem to thrive in summer heat or in very warm climates. Seedlings should be reset about a foot apart, with the excess weeded out. Older plants don't move well because they have tap roots.

When the umbels of seeds start to ripen they should be cut off and placed head down in a paper bag and left to dry in a warm, nonhumid place. Be sure to leave a few umbels to ripen on the plants to ensure self-sowing of seeds, which are winter hardy. There is another reason for leaving them. A few seeds are excellent to nibble on during a hot summer day when you are working in the garden and have a dry throat.

Chives, Bay and Thyme

Chives, which are perennial, are another favorite of mine. They have been cultivated at least since Charlemagne's time. With their purple blossoms in spring, chives are among

The handsome one-inch light purple flowers of chives (*Allium schoenoprasum*) are an ornamental bonus of this garden staple.



Roché

the house in autumn some three weeks before we turn on the heat. It thrives in a cool room with good light. In fact, bay makes an attractive house plant. Leaves are harvested fresh for kitchen use or dried, then stored in a jar. A hanging basket of curly-leaved parsley placed near the bay plant makes a nice winter accompaniment indoors, the finely cut light green foliage serving as contrast for the dark, somewhat heavy-textured appearance of the bay.

Thyme is my next choice, both in the BBG Herb Garden and at home, where I have a prostrate kind, mother-of-thyme (*Thymus serpyllum* of the trade), planted around the base of dwarf fruit trees. When the grass is mowed the combination gives an enchanting fragrance. Of course, we also grow thyme for kitchen use. Common or garden thyme (*T. vulgaris*) is the one my wife Fran uses the most.

Thyme needs sun and good drainage to perform well, and hardiness is not to be taken for granted in the North. If plants are grown in an open bed, some winter covering, such as salt hay or evergreen boughs, is advisable. On Long Island it is put down in December and removed in spring when crocus start to bloom. At that time I prune out dead portions as well as the old woody stems, if there are any. At the Botanic Garden I have managed to save the dozen-or-so different varieties of thyme by this practice for over fourteen years.

Dried thyme leaves should be stored in airtight containers; or freeze the leaves as you would other herbs.

Rosemary, Sage and Others

Rosemary is a must for herb gardens as well as for remembrance. This tender narrow-leaved evergreen shrub has to be overwintered indoors in the North. Good drainage is essential, but plants should not be allowed to dry out; keep soil evenly moist. There are varieties with prostrate stems, attractive when grown over a wall or treated as a bonsai. I like to plant tarragon near rosemary for subtle contrast.

We are also fond of kitchen sage (*Salvia officinalis*), a subshrub which grows about two feet tall. The soft gray-green leaves and violet-blue or white flowers, which are borne in summer, combine well with just about anything.



Clary sage and thyme make an attractive combination for sunny areas.

Sage is often a short-lived plant in the North, especially if drainage is poor, but the specimens at the Botanic Garden have stout woody stems and were obviously planted many years ago. There is a subtle point that might be mentioned in connection with the



Rosemary (*Rosmarinus officinalis*), a tender perennial, can reach sizable dimensions.

ornamental value of sage. The leaves are retained quite late into autumn and even into winter. They can be attractive after a snow, as can the gnarled branches.

Sage can be propagated by cuttings or from seeds. Plants should be spaced two to three feet apart. Be sure to remove spent flowers after bloom. Leaves can be harvested for kitchen use anytime during the growing season. Sage may be dried by hanging branches upside down in a warm dry place free from sunlight, so that the leaf color is retained.

Oregano and sweet marjoram, both of which are very useful herbs, are discussed in Gertrude Foster's article on page 28, so I will not mention them at length here. Oregano is reasonably perennial with us. Sweet marjoram, treated as an annual, is usually propagated by sowing seeds indoors in early spring six to eight weeks before setting out. This second step is performed after danger of frost has passed. Best leaf flavor is obtained just before flowering.

Mints

My favorite mints are peppermint, spearmint, pineapple mint and orange mint (the last also known variously as lemon, bergamot and eau-de-cologne mint). Most are indeed rampant growers, and at the Botanic Garden I confine them by setting out a few plants of

any one kind in bottomless wooden boxes buried in the ground. The boxes protrude about one inch above the soil level. They are two feet wide and one foot deep.

Most mints perform best in filtered light. They also divide easily. Frequent pinching of stems produces bushy, compact plants. Sprigs may be dried in a dark, airy, warm room; or keep fresh leaves in plastic bags in the freezer.

A Noble Jelly

Holly Shimizu of the National Arboretum puts horseradish on her list of ten favorite kitchen herbs (see page 16), and I heartily concur. There is no need to discuss its culture here, so I will close with a suggestion for a novel jelly which I first tasted during Old Home Day at Historic Richmondtown on Staten Island. Miss Margaret Robinson has been kind enough to supply the directions on how to make it. The ingredients consist of two cups sugar, one cup prepared horseradish drained, one cup white vinegar, red food coloring, one half bottle pectin.

Boil sugar and vinegar three minutes. Add horseradish and return to a boil. Stir in coloring to tint desired. Stir in pectin. Bring to a full boil. Boil hard for one minute, stirring constantly. Remove from heat, skim and pour into hot sterilized jelly glasses. Seal with paraffin. Makes three six-ounce glasses. ❧



Apple mint (*Mentha suaveolens*)

A number of suggestions for...

HERBS FOR TEA

Audrey H. O'Connor

*If you are cold, tea will warm you
if you are too heated, it will cool you
if you are depressed, it will cheer you
if you are excited, it will calm you.*

Gladstone

During the growing season, when your favorite culinary herbs benefit from pinching

of flavorful tips and young leaves, get out your teapot with a thought for herbal teas or tisanes to cheer the colder months ahead.

The true mints yield their refreshing oils readily when two tablespoons of the fresh herb are infused in a pre-heated teapot (of china, glass or earthenware—never metal). The brewing method: pour a pint of freshly boiled water on the herb and steep for five to

True chamomile (*Chamaemelum nobile*) is a perennial daisy relative with short ray flowers. Its tea is said to soothe and relax.



Reche

ten minutes. Then strain through a rush strainer directly into warmed teacups. Never boil herbal teas; do not add milk or sugar.

These tisanes can be invigorating or relaxing, to fit your mood or the time of day. Peppermint (*Mentha x piperita*) is the strongest flavor of the true mints. For variety try bergamot mint (*M. x piperita citrata*), apple mint (*M. suaveolens*), pineapple mint (*M. suaveolens* 'Variegata'), and the orange and ginger flavored cultivars. Experiment with other mint relatives from your garden when they are at the peak of their flavors: sweet marjoram, pineapple sage, the mountain-mints (*Pycnanthemum* spp.), anise-hyssop (*Agastache foeniculum*), lavender and rosemary. You may find a new flavor, as I did when leaves of Russian hyssop (*Hys-*

sopus seravschanicus) yielded a delightfully citric tisane, in contrast to the bitter flavor of *H. officinalis*.

Do lemon flavors grow in your garden? Lemon-verbena (*Aloysia triphylla*) is the most citric, tasting like lemon peel, but try lemon grass (*Cymbopogon citratus*), lemon thyme and lemon basil. Lemon balm (*Melissa officinalis*) supplies quantities of foliage, but it is relatively low in its essential oil; I find it loath to give much flavor, particularly when dried.

Once your favorite tea herbs are determined, plan a harvest for winter supply. Follow the rules for gathering, drying and storing as for culinary herbs. To make tea from dried herbs, follow the brewing method for fresh herbs, but use one teaspoon of dried herb for each cup. For cooling iced drinks, make a double strength brew of mint or lemon flavors, add ice and a slice of lemon or lime or a few borage flowers.

A Different Kind of Tea Party

A tea-tasting party can be an adventure in the discovery of flavorful herbal blends. Ask your guests to bring their favorite tea plants to share experience about their culture. For those new to herbal teas, supply a tin of a mild green tea of pale color, to be modified

Bergamot mint (*Mentha x piperita citrata*) has the same slightly smoky odor as bee balm.

J. Horace McFarland



with a choice of freshly dried herbal leaves for new flavors and dried flower petals for color. Violet, lavender, rosemary, borage, rose or calendula flowers or petals are decorative when floated in the cup.

Herbal tea enthusiasts should begin with a favorite herb flavor and blend with one or two milder flavors. An example would be chamomile (from dried flowers of the annual *Matricaria recutita*) as the base tea modified with apple mint and red clover. Or three mild flavors, such as elder flower, lemon thyme and bergamot, may be combined in equal strengths.

The blending of herbal flavors is an art. Care must be taken not to lose a subtle flavor by the addition of too much of a dominant flavor, such as peppermint or sage. If tempted to spice up a bland rose hip tea, add only a few cloves or bits of cinnamon stick. Ground spices become dust in the bottom of the blend and cloud the infusion.

Aroma, rather than color, is a guide to the tea's strength, since flowers and foliage vary in their yield of color. Some commercial blends include the calyx and bracts of the tropical roselle (*Hibiscus sabdariffa*) for color and acid flavor. This plant would be worth growing as an annual in southern herb gardens.

The tasting of blends is the criterion at your party. Individual tastes will differ; you will have as many favorite blends as you have guests. Each tea-taster should keep an ac-

curate record of proportions used and should have the privilege of naming the blend.

From next year's garden I must test new flavors for teas; fresh angelica leaves, the flowers of chicory, the leaves of French sorrel and costmary. The decorative shiny black fruits of the star-anise (*Illicium verum*) deserve another trial. The anise flavor in an infusion has been elusive. I may have been storing the fruits too long, enjoying their beauty. I must remember to dry leaves of *Salvia dorisiana*. Will its flavor be as delightful as the fruit salad fragrance of its fresh leaves?

This joy of discovering new taste pleasures can be yours. Know your tea herbs by growing them in your garden, using them in your kitchen.

Here is a tea to be drunk on going to bed so one wakes neither sick nor sorry:

One tablespoon lime blossoms (linden flowers, "tilleul," the most popular tisane in France)

One tablespoon rosemary

One teaspoon sliced ginger root or one-half teaspoon powdered ginger

Warm pot; add two cups boiling water to ingredients. Steep fifteen to twenty minutes. Drink hot, sweetened with honey. Best results if drunk *after* one is in bed! (This was found by Elizabeth Remsen Van Brunt in an ancient family notebook.) ❧

Gather the Leaves Slowly

"Three-quarters speed ahead, but keep the anchor dragging" are the words of advice for those wishing to experiment with different plants for herbal teas. As candidates, stick to those plants you know from personal experience or have read about in Audrey O'Connor's article. There are, in fact, some toxic plants in just about any garden of size. This is nothing to be unduly concerned about, for it is unlikely that we will chomp on colchicum bulbs, mountain-laurel leaves or wisteria seeds. However, it is important to avoid brewing teas from plants whose properties we do not know. Even the sassafras tea that grandmother used to drink has been under suspicion lately as a carcinogen, and fatal accidents have occurred from people confusing foxglove (*Digitalis purpurea*), which is toxic, with comfrey (*Symphytum officinale*). There should be no hysteria, just knowledge, which will bring greater enjoyment of traditional herbal beverages.

And if you have a serious illness, go to a doctor. Do not rely on herbal teas to get you well.

FMcG

A group name causes confusion . . .

THE ELUSIVE OREGANO

Gertrude B. Foster

When a four-year-old grandson sniffed a leaf of lemon balm, he wrinkled his nose and looked up knowingly. "That's the round yellow thing you put on fish," he said. Then more determinedly he added, "Why don't you plant these leaves and grow a lemon?" It's not a new idea that by planting one part of an herb you can change the character of the harvest! The herbalists suggested in 1539,

"If you will have the leaves of the parcelye grow crisped, then before the sowing of them stuffe a tennis ball with the sedes and beat the same well against the ground whereby the sedes may be a little bruised or when the parcelye is well come up go over the bed with a weighty roller whereby it may so presse the leaves or else tread the same down under thy feet."

The Grete Herball

Today gardeners sometimes are expected to transform sweet marjoram (*Origanum majorana*) into oregano by purchasing a plant and putting it in the garden. Oregano is a flavoring and scent which occurs in many different genera but is most often found in the *Origanum* genus. The mixup within that variable genus may begin with the seed. Sweet marjoram seed may be labeled oregano, or vice versa. It is hard to blame the grower when John Parkinson stated in Chapter V of his *Theatrum Botanicum*, "There is much controversie among the Modern writers about these two herbs." He was writing in 1640.

Straightening It Out

In 1947, the late Dr. George H.M. Lawrence, then director of the Bailey Hortorium at Cornell University, wrote for *The Herb Grower Magazine* a short piece on the distinction of the two species, *Origanum majorana* and *Origanum vulgare*, the latter of which was one source of the oregano flavor. Both were available as seed at that time through our Laurel Hill Herb Farm. Dr.

Lawrence began by saying that "*Origanum* and *Majorana* are each good genera, but botanists and horticulturalists have sometimes confused and muddled their identities by unfortunately placing species belonging to one or the other in juxtaposition; other botanists have treated them as belonging to a single genus.

"*Origanum* has the conventional more or less tubular calyx terminated by five teeth or lobes. In *Majorana* the calyx is split down one side and flares out, resembling a bract. See the drawing prepared by Marion Ruff, our staff artist, of the flowers of *Majorana hortensis* and of *Origanum vulgare* to better understand this distinction of the calyx. There are other more superficial differences, notably that in *Majorana* the flowers are generally arranged in tightly congested globose to spike-like heads, whereas in *Origanum* they are more loosely disposed."

In *Hortus Third* the *origanums* are treated as a single genus again. This leaves it to the non-botanists to try to find the elusive oregano flavor among many, not just two, species. It occurs in *Origanum vulgare* in a variety known as *prismaticum*. The leaves closely resemble the type, also known as wild marjoram, and the flowers are on branching stems with overlapping bracts as well as five pointed calices.

The first oregano we grew in the early 1940s came from seed shaken out of a bundle of dried oregano marked "Product of Greece." The herb is cut while about to bloom or in full flower with some seed forming. It took a knowledge of small seeds to separate the chaff from the viable grains. The resulting plants were named *Origanum vulgare* var. *viride* by the Bailey Hortorium. At that time they did not have a herbarium specimen of *Origanum onites*, called pot marjoram. It, too, has the shell-like formation of the calyx and is thus distinguished from wild marjoram. To separate it from sweet marjoram, now called *Origanum majorana*, Dr. Lawrence stated that there are



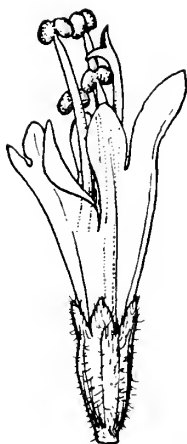
Origanum vulgare var. *viride*, grown from seed of an oregano shipped from Greece.

20-to-24-inch stems and unstalked or sessile leaves on *Origanum onites*, or pot marjoram. The leaves have reddish dotlike glands on calyx and corolla. These features must be observed with a magnifying glass. The scent of "Rigani," as pot marjoram is called on Crete, is brighter and sharper than either oregano or sweet marjoram.

For a time *Origanum onites* was in herb gardens in this country courtesy of Dr. and Mrs. Robert Whallon, who collected seed on the Island of Crete. *The Herb Grower Magazine* made available the handmade packets Mrs. Whallon sent from their own collection made in the wild. Unfortunately it did not prove hardy in many colder parts of the United States, and those given to nurserymen to propagate may not have seeded well or have become indistinguishable from other

species of *Origanum* after they left the greenhouses.

Plants for sale in the spring are not usually in flower, so how can the gardener determine at that season which is sweet marjoram and which oregano? It is not easy unless you have felt, smelled and watched sweet marjoram produce its curious fat buds, which gave rise to the Elizabethan name of "knotted marjoram." They are composed of overlapping bracts which are rounded and split at the calyx to allow small white tubular flowers to protrude just a bit. The texture of the leaves is more velvety than those of *Origanum vulgare*, or oregano. The nurseryman won't appreciate having leaves pulled off plants to be felt and smelled. But you can lightly brush them and recognize the scent that you know from a jar of dried sweet mar-



Origanum
enlarged 6 times

joram. If there are blossoms, look for the above characteristics or the branching spikelets of pink or white flowers of *Origanum* species and varieties.

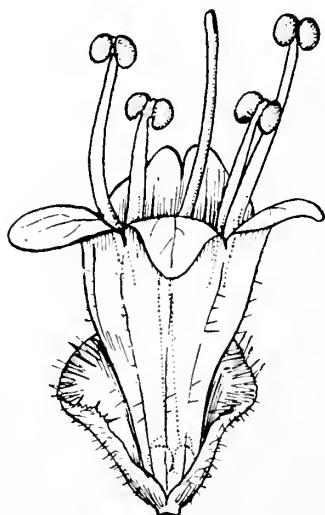
Others with Oregano Scent

To go back to our observer of similarities in aromas, the four-year-old, it may frustrate you to learn that there are several other genera of herbs with the same "oregano" scent and savor. One is *Coleus amboinicus*, native to tropical regions. Another is a spe-

cies of *Monarda*, resembling *M. fistulosa*, sold as dried oregano in the southwestern United States and Mexico. The most readily available to herb gardeners in the North is a hardy, roundish-leaved species of thyme, one of several plants called Spanish thyme, *Thymus nummularius*. Its taste and smell are stronger than those of any member of the genus *Origanum*. The dried foliage is to be used as pizza flavoring with a lighter hand.

The genus *Origanum* also includes several other species grown for oregano flavor—*O. virens* (Spanish oregano), *O. sipyleum* from Turkey, and something called Greek oregano, which may be *O. heracleoticum* (less flavorful according to Dr. Whallon). All of which brings us back to the herbalists, particularly John Gerard, who in 1597 could say of marjoram, "it groweth in my garden," but he noted that some did not live over the winter in England. The best way to get acquainted with the herb is to grow it yourself, even if you have to shake seed out of a bundle of the dried imported herb.

Lucas Calpouso of Harvard University has stated in an article "Botanical Aspects of Oregano" in *Economic Botany* (Vol. 8, No. 3, 1954) that "the condiment name 'oregano' should be understood to refer not to any one species but to a particular spice flavor, furnished by plants of several genera in different parts of the world." To the herb gardener this is understandable, as costmary smells and tastes more like mint chewing gum than does spearmint, though it is in the Compositae, not in the Labiatae. ❧



Majorana
enlarged 12 times

PROPAGATING CULINARY HERBS

Helen Whitman

Propagating herbs for one's own garden is an excellent way to maintain and add to a collection, and also pays an extra dividend in interest and satisfaction—a feeling of having accomplished something worthwhile.

Most of the common herbs can be propagated easily by one or more of the usual methods of plant propagation—seeds, cuttings, division, or layering. Since these are standard horticultural techniques, they will not be discussed at length here. (For details of the various methods of propagation, see the *BBG Handbook on Propagation*.)

Growing from Seed

A great many herbs can be grown from seed with very little trouble. Annuals are best started out-of-doors in open ground after the soil has warmed up and danger of frost is over. In the vicinity of New York City this is about the first of May. The following annual herbs described in the dictionary section of this handbook, are easy to grow from seed:

anise	coriander
basil	dill
borage	fennel
calendula	nasturtium
caraway	summer savory

Some herbs are biennials, that is, they come from seed the first year but do not bloom and set their own seed until the following year. Most of these are also easy to grow from seed. Among them are burnet and clary sage.

With one or two exceptions, seeds of biennials are planted in spring like those of annuals. Angelica seeds are said to be very short-lived, so they should be sown as soon as they are ripe, in late summer. Parsley is also a biennial, but its flowers and seeds are of no particular interest to the herb gardener, so it is often treated as an annual. The seeds of parsley are very slow to germinate, taking as much as a month to six weeks, so they should be started in pots or flats in January for transplanting to the garden later. Soaking the seed in warm water for about 24 hours

may hasten germination a little. Because parsley, like many other members of the carrot family, has a tap root, the seedlings are not easily transplanted except when very small. One way to get around this difficulty is to plant in small pots, two or three seeds in each. After the seedlings have started to grow, all but the strongest one in each pot are pulled out. When the plants are large enough to be planted in the garden, they can be turned out of the pots and put into the ground without injuring the roots.

Perennial herbs can also be grown quite easily from seed. They are best started indoors in flats in early spring and transplanted later to the garden. The following are frequently propagated in this way:

catnip	marjoram, sweet
cicely, sweet	marjoram, wild
horehound	pink, clove
hyssop	sage
lovage	savory, winter
marjoram, pot	thyme, common

Seeds of sweet cicely require exposure to cold for good germination and should be planted in fall to come up the following spring. If preferred, they may be stratified in moist sand or peat moss.

Division

Propagation by dividing the plants is practiced with a large number of perennial herbs, including the following:

balm, lemon	mints
bible leaf	tarragon
chives	thyme, creeping
flag, sweet	thyme, lemon
horehound	violet, sweet
marjoram, pot	woodruff
marjoram, wild	

Divisions are best made in spring so the plants have plenty of time to become re-established before cold weather.

Cuttings

Stem cuttings 1 to 3 inches long, taken from new growth and rooted in sand or vermiculite, provide a convenient way of multiplying many herbs. Among those often propagated in this way are:

geraniums, scented	rosemary
horhound	sage
laurel	sage, pineapple
lemon-verbena	savory, winter
marjoram, sweet	thyme, common

Many of these can be taken at any time during the growing season, but in general spring is the best time.

Two herbs, woodruff and tarragon, are most frequently propagated by root cuttings rather than stem cuttings.

Layering

Layering is not such a common method of propagating herbs, but the thymes and no doubt several others, such as most mints, can be increased in this way. ❧

Gardens to Visit

Planning a kitchen border? See as many herb gardens as you can to get an idea of the plants in action, as well as inspiration for design. All of the places listed below have herb gardens within their larger frameworks. In addition, a number of restored villages and historic areas, too many to include here, have herb gardens well worth a visit.

- Berkshire Garden Center, Rtes. 102 and 183, Stockbridge, MA 01262
- Boerner Botanical Gardens, 5879 S. 92nd St., Whitnall Park, Hales Corners, WI 53130
- Brooklyn Botanic Garden, 1000 Washington Ave., Brooklyn, NY 11225; outreach herb gardens are at BBG Research Center, 712 Kitchawan Rd. (Rte. 134), Ossining, NY 10562 and Clark Memorial Garden, 193 I.U. Willets Rd., Albertson, NY 11507.
- Chicago Botanic Garden, Lake Cook Rd., Glencoe, IL 60022
- The Cloisters, Fort Tryon Park, New York, NY 10040
- Denver Botanic Gardens, 909 York St., Denver, CO 80206
- Garden Center of Greater Cleveland, Western Reserve Herb Garden, 11030 East Blvd., Cleveland, OH 44106
- Gardens of Cranbrook, 380 Lone Pine Rd., Bloomfield Hills, MI 48013
- Hancock Shaker Village, Rte. 20, Hancock, MA
- Longwood Gardens, Rte. 1, Kennett Square, PA 19348
- Los Angeles State and County Arboretum, 301 N. Baldwin Ave., Arcadia, CA 91006
- Missouri Botanical Garden, 2345 Tower Grove Ave., St. Louis, MO 63110
- Montreal Botanical Garden, 4101 Sherbrooke St., E. Montreal, Quebec H1X 2B2, Canada
- National Arboretum, 24th and R Sts. N.E., Washington, D.C. 20002
- New York Botanical Garden, Bronx Park, Bronx, NY 10458
- North Carolina Botanical Garden, Laurel Hill Rd., Chapel Hill, NC 27514
- Old Sturbridge Village, Rte. 20, Sturbridge, MA 01566
- Quincy Homestead, 1010 Hancock St., Quincy, MA
- Strybing Arboretum, 9th Ave. and Lincoln Way, Golden Gate Park, San Francisco, CA 94122
- Tennessee Botanical Gardens, Cheekwood, Cheek Rd., Nashville, TN 37205
- Botanical Garden of the University of British Columbia, 1501 N.W. Marine Dr., Vancouver, B.C. V6T 1W5 Canada
- Washington National Cathedral Bishop's Garden, Mt. St. Albans, Washington, D.C. 20016
- Wave Hill Center for Environmental Studies, 675 W. 252nd St., Bronx, NY 10471
- Wick Farm Garden, Tempe Wick Rd., Morristown National Historical Park, Morristown, NJ 07960
- Robison York State Herb Garden, Cornell Plantations, Cornell University, 100 Judd Falls Rd., Ithaca, NY 14853 ❧



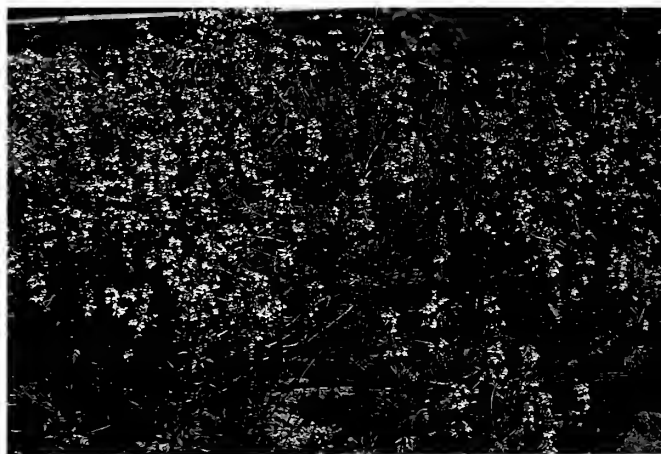
ORNAMENTAL USES OF CULINARY HERBS

Herbs can be used for formal or informal effects. By utilizing the rich textures and subtle colors of herbs, patterns can be established and, with pruning, designs of varying complexity can be maintained.





Angelica archangelica, a tall, elegant plant with finely cut foliage, is striking in the back of a border.



Thymes come in smooth, woolly, ground-hugging and upright forms, but all produce rich blankets of purple, pink or white flowers.



Clary sage (*Salvia sclarea*) has large, richly textured leaves with handsome lilac, pink or white flower spikes.

The Mint Family has a surprisingly wide variety of leaf colorings, including this golden ginger mint (*Mentha x gentilis* 'Variegata').



Anita Schuraw



George Tidman

Variegated sage (*Salvia officinalis* 'Tricolor') contrasts pleasingly with the delicate silvery mound of santolina in this garden corner.

Dill (*Anethum graveolens*), a member of the Carrot Family, has foliage and seeds that are put to wide use in flavoring and pickling.



Pamela Harper



Upper left, a striking combination of pink filipendula and dark red bee balm (*Monarda didyma*); upper right, the intense red flowers of pineapple sage (*Salvia elegans*); center right, peppermint and rose geranium contrast in color and texture; below, nasturtiums (*Tropaeolum majus*) have the same peppery flavor in their leaves and flowers as their watercress cousins.



How to Know Families of Herbs

The great majority of herbs commonly grown belong to five large plant families: The mint, composite, parsley (or carrot), borage and mustard families. Each of these contains many members which differ from one another, yet all the members of any one family show certain "family resemblances" by which they can be easily recognized. The following brief descriptions and drawings point out the most important characteristics of those five families.

The Mint Family (*Labiatae*) with square stems and mostly irregular, 2-lipped flowers having 4 stamens. The fruit is small, with 4 nutlets ('seeds'). Here we find: mint, basil, sage, ajuga, teucrium, rosemary, lavender, horehound, nepeta, agastache, lamium and thyme.



Flower cluster of thyme (left) and a typical flower of the Mint Family enlarged (right).

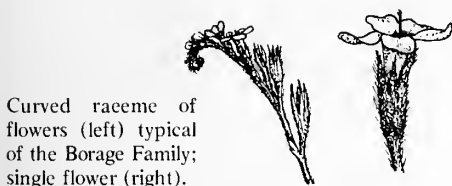


Flower head of a Composite (left), a disk flower enlarged (right, above) and a ray flower (right, below).

The Parsley Family (*Umbelliferae*), often with hollow stems, flowers in flat-topped clusters called umbels. In this group fall: caraway, chervil, coriander, dill, fennel, cumin, lovage, pimpinell, myrrh, wild carrot, parsley, angelica, goutweed and skirret.



Umbel of flowers typical of the Parsley Family (left) with single flower enlarged (right).



Curved raceme of flowers (left) typical of the Borage Family; single flower (right).

The Borage Family (*Boraginaceae*), with tubular flowers mostly in curved racemes and having 5 stamens attached to the tube. The ovary is superior, usually forming a fruit composed of 4 nutlets. Among the members of this family are: borage, cynoglossum, forget-me-not, mertensia, pulmonaria, symphytum, anchusa, brunnera, echium and true heliotrope.

The Mustard Family (*Cruciferae*), has flowers with 4 petals forming a square cross, 4 long stamens and 2 short ones, and superior ovary. Here are: woad, mustard, peppergrass, honesty, upland cress, dentaria, stock and watercress.



Flower cluster and single flower typical of the Mustard Family.

AN ILLUSTRATED DICTIONARY OF HERBS



Reule

Sword-shaped leaves of sweet flag

Sweet Flag (*Acorus calamus*)

A native plant having slender, lilylike leaves as long as 6 feet.

Use: Leaves and thick rootstalks have strong, aromatic, lemony odor and are used for sachets and flavoring. Roots can be candied. Also used in medicine.

Horticultural Use: Best grown in clumps

and kept in background. Will grow in damp spots.

Culture: Thrives in wet soil and full sun, can be grown in drier places. Sweet flag is a hardy perennial, propagated by division.

Harvesting: Leaves can be used fresh; roots harvested in fall after plant dies down.



Plant of chives in full bloom

Chives (*Allium schoenoprasum*)

A small, dainty onion growing in clumps that reach about 10 inches high. Decorative light purple flowers in spring. Another species, garlic chives (*A. tuberosum*) has white flowers in late summer and may reach 3 feet in height.'

Use: Leaves give a delicious onion flavor to foods.

Horticultural Use: Neat habit and attractive flowers make chives excellent as border plants.

Culture: Demands little care other than dividing on becoming over-crowded. Hardy perennials, chives are easily propagated by division or from seed.

Harvesting: The fresh leaves are cut for use as they grow.



Light purple flower heads of chives



Garlic has flat leaves unlike those of many onions

Garlic (*Allium sativum*)

Garlic is one of the flat-leaved onions, growing to about 2 feet. It has pinkish flowers in small heads.

Use: The bulbs, which break into small sections called "cloves," are a distinctive and well-known flavoring in many types of cookery.

Horticultural Use: The leaves and flowers are not unattractive, but the plant has no special horticultural value.

Culture: Grows in any good garden soil. Perennial, propagated by sets.

Harvesting: Mature bulbs dug and dried.

Lemon-verbena (*Aloysia triphylla*) (formerly *Lippia citriodora*)

A tender, woody shrub which in warm climates may reach 10 feet but is usually much smaller. In temperate climates it must be taken indoors in winter. The crisp, narrow, shiny leaves are strongly lemon-scented.

Use: The leaves are used for their fragrance and to give a lemony taste to teas, cold drinks, jellies, etc.

Horticultural Use: No special horticultural value; may be used as pot or tub specimens.

Culture: Will grow in any good garden or potting soil. Propagated from cuttings. Bring indoors at first signs of cold weather.



Lemon-verbena



Angelica is a tall, handsome plant with round flower heads.

Angelica (*Angelica archangelica*)

A large, handsome plant which may reach 6 feet in height. The spreading leaves are divided into three-parted leaflets; the small greenish flowers are borne in rounded clusters (umbels) on the tops of the stems.

Use: Oil from the roots, leaves or seeds is used in perfumes; the leaves and stalks can be used as a vegetable. The principle use, however, is as a condiment or confection, the hollow stems being candied for the purpose.

Horticultural Use: Best for bold accent

plant or as background for other plants.

Culture: Angelica is generally treated as a biennial and grown from seed. These should be planted in the fall, or stratified. Does best in a rather moist soil and cool climate.

Harvesting: Young stems are best for candying, roots and leaves are collected the second year of growth, seeds when ripe in late summer.

Angelica atropurpurea is native to the United States. It can be used in ways similar to *A. archangelica*.



Dill plant in bloom

Dill (*Anethum graveolens*)

Bluish-green stems contrast with finely divided, yellow-green, plumelike leaves and yellowish flowers. Grows to about 2 or 3 feet.

Use: Leaves and seeds famous for flavoring pickles, and also useful in other cookery, as with fish. Seeds yield a fragrant oil.

Horticultural Use: The finely divided light green leaves have a delicate, almost misty effect.

Culture: Dill is an annual that is easily grown from seed sown in spring after danger of frost. Should be sown in place, as it is not easy to transplant.

Harvesting: Leaves are best just as the flowers open. Seeds are picked when ripe.

Chervil (*Anthriscus cerefolium*)

An annual growing 2 feet or less in height, with lacy leaves somewhat like parsley but lighter green. Flat heads of delicate white flowers.

Use: Chervil is used much as parsley is, in soups, salads, etc.

Horticultural Use: Requires semi-shade, so can be used in a shaded corner of the herb garden.

Culture: Raised from seed sown early in spring.

Harvesting: The fresh leaves are cut for use when large enough.

Tarragon (*Artemisia dracunculus*)

Quite different in appearance and use from other artemisias, tarragon is an herbaceous perennial about 2 feet tall, much branched, with narrow somewhat twisted green leaves.

Use: The leaves of tarragon have a distinctive flavor a little like that of anise and are used in salads and other cookery. They yield their flavor to vinegar in which they are steeped.

Horticultural Use: No outstanding horticultural value.

Culture: Will grow in full sun, but seems to do better with a little shade. Propagated from root cuttings or by division. Protect in winter in cold climates.

Harvesting: Young leaves and stem tips are best to use fresh or to flavor vinegar. Flavor lost on drying.



Tarragon leaves



Star-shaped flowers of borage are a beautiful blue color.

Borage (*Borago officinalis*)

A decorative annual, with coarse, very hairy leaves and stems and beautiful sky-blue, starry flowers. It grows 2 to 3 feet tall.

Use: Flower sprays and leaves are used to impart a cool, cucumberlike flavor to summer drinks. It is said to be a good bee plant.

Horticultural Use: Valued chiefly for the beautiful color of the flowers. There are also white and reddish-purple varieties.

Culture: Easily grown from seed and will self-sow. Does best in dry sunny places.

Harvesting: The blossoms are picked as they open. The leaves are used fresh at any time; they are very seldom dried.



Calendula, Pot Marigold (*Calendula officinalis*)

A decorative annual, often grown in flower gardens. It grows from 1 to 2 feet tall, and has flat, round, many-rayed, yellow to orange flower heads.

Use: The petals of the flowers impart their yellow color and a subtle aromatic flavor to foods with which they are cooked. A tincture was formerly used in medicine.

Horticultural Use: Much prized for the brilliance of the blossoms.

Culture: Easily raised from seed after danger from frost is over. Will self-sow. Does best in bright sun.

Harvesting: The flowers are cut when fully open and the "petals" (actually florets) separated and dried in a shady place.

Calendulas are common garden flowers as well as herbs.

Caraway (*Carum carvi*)

A biennial growing about 30 inches tall. The flowers are borne in flat white clusters and, like the finely cut leaves, resemble those of carrot.

Use: The seeds of caraway have a warm, aromatic odor and flavor and are popular in cooking. The oil is an important ingredient in liqueurs such as kummel.

Horticultural Use: Caraway has no special horticultural value, although the lacy leaves and flowers are rather attractive.

Culture: Easily raised from seed. Plants usually do not bear seed first year they are planted, but if started in fall will bear the following year.

Harvesting: Seeds picked when ripe.



Seeds and flowers of caraway



Large, fragrant leaves of costmary

Bible Leaf, Costmary (*Chrysanthemum balsamita*)

Perennial that may grow to as much as 5 to 6 feet, with leaves 5 or 6 inches long and about 1½ inches wide. They are light green, with small teeth on the margins and have a pleasant, camphory, mintlike fragrance. Flowers like small daisies.

Use: Leaves used for tea, and for their fragrance. They are also supposed to be useful as a moth preventive.

Horticultural Use: Best kept in the background as it grows large and is somewhat coarse.

Culture: Bible leaf is hardy and easily propagated by division. Does well in average soil, in dry sunny place.

Harvesting: Young leaves are cut before the plant flowers.



Lacy flower head of coriander

Coriander (*Coriandrum sativum*)

A dainty annual growing to about 2 feet. The leaves are very finely divided, ill-smelling and tasting. Small white or purplish-tinged flowers in small flat heads.

Use: The globular seeds, about 1/8 inch in diameter, have a delicious perfumed taste and odor and are used as a condiment and in confections.

Horticultural Use: Attractive in clumps when in flower.

Culture: Easily grown from seed sown in spring. Does well in any good garden soil.

Harvesting: Seeds are picked when mature, before they fall.



Saffron is the dried stigma from the center of the saffron crocus, an autumn bloomer.

Saffron Crocus (*Crocus sativus*)

A small, autumn-flowering crocus with lavender flowers having a bright orange stigma. Beginners should not confuse it with the much larger colchicum which is also sometimes called autumn crocus and is poisonous.

Use: The orange stigmas when dried constitute saffron, widely used in cooking for its color and flavor.

Horticultural Use: Attractive as a welcome note of late color in the herb garden.

Culture: Grown from bulbs planted 4 inches deep in late summer. Need protection in the North.

Harvesting: Flowers picked as soon as open and stigmas removed and dried.



Blossom of clove pink has spicy fragrance.

Clove Pink (*Dianthus caryophyllus*)

Perennial, with jointed stems and blue-green, grasslike leaves and small carnation-like flowers. The fragrance of the flowers is penetrating and spicy, resembling cloves.

Use: Flowers are prized for their fragrance and used to flavor wine and vinegar.

Horticultural Use: Clove pink is a useful plant for a low border.

Culture: Can be propagated from seeds, cuttings, or by layering. It is hardy, but needs protection in cold climates. Should have good drainage.



Seeds and flowers of fennel

Sweet Fennel (*Foeniculum officinalis*)

This fennel is an annual growing to about 3 or 4 feet. The leaves are finely divided into threadlike segments, light green in color, or in one horticultural variety, maroon.

Use: The seeds are used as a condiment, the leaves for their aniselike flavor, and the stems can be eaten like celery.

Horticultural Use: No special value, but the leaves are attractive.

Culture: Grows easily from seed planted in spring.

Harvesting: Seeds are picked when ripe; the best stems for eating are the tender flower stalks, just before blossoming.

Other fennels: Florence fennel (*F. dulce*) is used as a vegetable, the thickened, bulbous leaf bases being cooked or eaten fresh. Bitter fennel (*F. vulgare*) is a perennial used much as the others are.

Sweet Woodruff (*Galium odoratum*)

Low spreading plant forming clumps about 8 inches high. The slender leaves are borne in starry whorls; the flowers are very small and white, in loose clusters. The plant, when crushed, and especially when dried, has a sweet scent of new-mown hay and vanilla. Formerly called *Asperula odorata*.

Use: The most famous use is for flavoring the German May-wine, and it can be used in other drinks.

Horticultural Use: Woodruff makes a charming ground cover under taller plants.

Culture: Can be grown as a perennial if winters are not too severe. In cold climates plants may be kept indoors or in cold frame over winter. Will thrive in half-shaded places.

Harvesting: Plants are harvested and dried in spring, when fragrance is strongest.



Whorled leaves and white flowers of woodruff



American pennyroyal

American Pennyroyal (*Hedeoma pulegioides*)

A small, branching native annual that grows to about 18 inches. It has the mintlike odor of true pennyroyal.

Use: Used like true pennyroyal to make a tea for coughs and colds. Repels mosquitoes.

Horticultural Use: No particular horticultural value.

Culture: Does best in light shade. Grows from seed.

Harvesting: The whole plant is cut and dried just before flowering.

Hyssop (*Hyssopus officinalis*)

A hardy perennial growing to not more than about 2 feet, with woody stems, small pointed leaves, and spikes of small purple flowers. There are forms having pink or white flowers.

Use: The pungent leaves are used to flavor liqueurs and sometimes as a condiment. Oil obtained from them is used in perfumery.

Horticultural Use: Because it can be clipped, hyssop makes a good border plant or small hedge.

Culture: Will grow in rather poor soils and is easily propagated from seed. When established it is quite hardy.



Flowers of hyssop

Laurel, Bay Leaf (*Laurus nobilis*)

An evergreen tree which may reach 40 feet in height in its native Mediterranean region but is usually from 4 to 10 feet high and grown in containers in colder climates. It is the true laurel used for victory wreaths in classical Greek and Roman times.

Use: The glossy evergreen leaves are known to all cooks as bay leaves, used extensively in cooking.

Horticultural Use: Principally used as accent or specimen plants in tubs or boxes. Can be clipped.

Culture: Must be taken indoors in winter in any but semitropical climates. Requires rather rich, moist soil. Propagated from cuttings.

Harvesting: Mature leaves can be picked and dried for use at any time.



Laurel leaves are familiar to cooks as bay leaves. No relative to mountain-laurel (*Kalmia latifolia*).



Celerylike lovage leaves

Lovage (*Levisticum officinale*)

A hardy perennial herb with large, rich green leaves that resemble those of celery in appearance and taste, but stronger and sweeter.

Use: Leaves and stems give a celery flavor to soups and salads. Stem bases can be blanched and eaten.

Horticultural Use: Forms large clumps as much as 4 or 5 feet tall. Good background for smaller plants.

Culture: Does best in a rich, fairly moist soil. Propagated from seeds planted in late summer.

Harvesting: Leaves can be used fresh or dried at any time.

Horehound (*Marrubium vulgare*)

Somewhat coarse perennial, the entire plant covered with a whitish down. The leaves are crinkled and tend to turn downward.

Use: Horehound is the source of the familiar old-fashioned horehound candy.

Horticultural Use: The gray color of the plant provides a striking accent. Because of its weediness it is best kept toward the back of a planting.

Culture: Grows well in light soil, withstands full sun and intense heat. Hardy, but should be protected in very cold climates. Propagated from seed, cuttings, or by division.



Woolly gray leaves of horehound

Lemon Balm (*Melissa officinalis*)

A somewhat weedy perennial growing to about 2 feet in height. The entire plant has a strong lemon scent.

Use: The leaves are sometimes used for tea, and sprigs are put into cool drinks to impart a lemony taste. Oil from the leaves is used in perfumes.

Horticultural Use: Lemon balm is best planted where it is not too conspicuous because of its weedy habit. It has a tendency to spread and must be kept within bounds.

Culture: Thrives in poor soil in a warm, sunny spot. Can be propagated from seed sown in spring, or by dividing.

Harvesting: Leaves and sprigs are picked in the morning whenever plants are large enough and used fresh or dried.



Leaves of balm have strong lemon fragrance.



Leaves of peppermint are borne on short stalks.

Peppermint (*Mentha X piperita*)

Perennial with spreading rootstocks and numerous upright stems 2 feet or more tall. Dark green leaves and reddish-tinged stems have a characteristic warm spicy scent.

Use: Leaves used for tea and flavoring. Oil from the plant is used in confectionery and medicine and is the source of menthol.

Horticultural Use: No special value as an ornamental.

Culture: Does best in a rich, moist soil. Fairly hardy except where winters are severe. Propagated by division or cuttings.

Harvesting: Fresh leaves used at any time. Leaves to be dried are best taken just as flowering commences.

Pennyroyal (*Mentha pulegium*)

Prostrate perennial with small oval leaves and creeping stems. It has a very pungent peppermintlike scent.

Use: Pennyroyal is used to make a tea for coughs and colds. The plant contains substances poisonous to some people so should be used with caution.

Horticultural Use: Could be used as a ground cover, but is somewhat weedy in appearance.

Culture: Easily propagated by division. Needs renewal every few years. It is a tender perennial which should be taken in over winter in cold climates.

Spearmint

(*Mentha spicata*)

Crisp-looking perennial with pointed, slightly crinkly leaves, lighter green than those of peppermint. The whole plant has a sweet characteristic odor.

Use: Leaves are used to flavor cold drinks, in teas, and to make mint sauce. Oil is used in confectionery.

Horticultural Use: No outstanding value, although its rich green color is pleasing.

Culture: Grows best in a somewhat moist

soil. Propagated by cuttings or divisions. Hardy.

Harvesting: Fresh leaves and leafy stem tips picked any time. For drying, it is best cut just as flowering begins.

Note: Another species, apple mint (*M. suaveolens*), with rounded, hairy leaves, has become popular in recent years because of its strong flavor. One of the best in teas.



J. Horace McFarland

Spearmint flowers are in spikes at top of plant.



Flowers of bee balm are a bright red.

Bee balm (*Monarda didyma*)

A handsome perennial that grows to about 4 feet, with beautiful scarlet flowers in round heads. The leaves have a pungent lemony scent resembling bergamot mint.

Use: Bee balm makes an aromatic tea.

Horticultural Use: The plants make strong clumps and the blossoms provide a welcome splash of color in the herb garden. There are

varieties with deep red, violet, pink and white flowers. Wild bergamot (*M. fistulosa*) is very similar but has lavender flowers and there is also a white-flowered form.

Culture: Hardy and will grow in sun or light shade. Propagated by division or grown from seed.



Leaves of sweet cicely resemble ferns.

Sweet Cicely (*Myrrhis odorata*)

A very decorative perennial with downy, fernlike leaves and umbels of white flowers. It grows 3 to 4 feet tall.

Use: The green seeds have a spicy taste and are mixed with other herbs. They are used in certain liqueurs.

Horticultural Use: The delicate leaves and

flowers are attractive and have a light airy appearance.

Culture: Grows best in partial shade. Seeds are planted in fall of the year or stratified.

Harvesting: Seeds are picked green and used fresh.

Sweet Basil

(*Ocimum basilicum*)

A pretty annual, about 18 inches tall, with light green rather broad leaves. The flowers are small and white, in spikes. There are several species of basil in cultivation, at least one having attractive purple leaves.

Use: The spicily-scented leaves are one of the most popular of all herbs used in cooking. They are considered especially good with tomato dishes, and are used fresh or dried.

Horticultural Use: The light green leaves are attractive, especially while the plants are young, and the purple-leaved kind, 'Dark Opal', gives an interesting color in the herb garden.

Culture: Grows easily from seed planted when danger of frost is over.

Harvesting: Leaves can be picked about six weeks after planting. For drying, it is best to cut them just before the flowers open.



Basil



Leaves and flower heads of sweet marjoram

Sweet Marjoram (*Origanum majorana*)

One of the most fragrant and popular of all herbs. It is low and spreading, reaching about 8 to 12 inches in height, with small, oval, gray-green leaves that are velvety to the touch. This species and the next were placed in the genus *Majorana* for many years.

Use: The fresh or dried leaves are widely used as a flavoring in cooking. Oil is used in perfumery.

Horticultural Use: Gray-color foliage contrasts well with brighter greens. Can be used in borders.

Culture: Easily grown from seed or cuttings. In the North it is best treated as an annual or kept over winter as a pot plant. In the South it is perennial.

Harvesting: Use fresh at any time; cut leafy stems at flowering time and dry for future use.

Pot Marjoram (*Origanum onites*)

Differs from sweet marjoram in being hardier and in having slightly larger leaves without stalks. The scent and flavor are somewhat more thymelike than those of sweet marjoram.

Use: Same as for sweet marjoram.

Horticultural Use: No particular horticultural value.

Culture: Grows best in a light limestone soil. Hardy in the vicinity of New York City, it should be taken indoors where winters are very severe. Propagated from seed or by division.

Harvesting: Same as for sweet marjoram.

Wild Marjoram (*Origanum vulgare*)

Hardy perennial with sprawling stems which may become 2 feet high. Much coarser than sweet marjoram, it smells more like thyme. Small pink or white flowers.

Use: The leaves are used as a flavoring in cooking but most people do not consider them as good as sweet marjoram leaves.

Horticultural Use: Weedy sprawling habit makes this plant of little value as an ornamental, but the flowers are pleasantly fragrant.

Culture: Grows well in poor soil, propagated by seeds or divisions.



Roche

Flowers and leaves of wild marjoram

Rose Geranium (*Pelargonium graveolens*)

Tender perennial which must be wintered indoors in most of the United States. Where it can be grown outside the year around it may reach a height of 4 feet, but it is usually much smaller than this. The leaves are lobed and cut, rough to the touch, and smell of roses with an overtone of spice.

Use: The plants are grown commercially for the fragrant oil distilled from them. The leaves are used to give a rose flavor to desserts and jellies.

Horticultural Use: Rose geraniums are often used as pot plants, set in the garden in warm weather. The small lavender flowers are attractive but not showy.

Culture: Do well in any good garden soil, need sun. Propagated from cuttings.

Harvesting: The leaves can be cut at any time from mature plants.



Flowers of rose geranium

Roche

Peppermint Geranium (*Pelargonium tomentosum*)

This geranium has gray-green, velvety, shallowly-lobed leaves that smell strongly of peppermint.

Use: Peppermint geranium is used in pot-pourris and in cooking to give a peppermint flavor to jellies, desserts, etc.

Horticultural Use: Attractive bedding or pot plants.

Culture: Similar to that for rose geranium.



George Tolomits

Velvety leaves of peppermint geranium

Parsley (*Petroselinum crispum*)

A hardy biennial usually treated as an annual. Grown for its much-divided, sometimes-curly leaves which have a characteristic odor and flavor.

Use: One of the most familiar of all herbs, used as flavoring and for garnish.

Horticultural Use: The beautiful green leaves and compact habit of parsley in its first year of growth make it a good plant for edging.

Culture: Grown from seed started in early spring. Or purchase young plants then. Slow to germinate.

Harvesting: Cut any time when large enough. leaves are used fresh, or they may be dried in a slow oven (about 150°F) until crisp.



J. Horace McFarland

Parsley used as border for bed of annuals.



Flower heads of anise

Anise

(*Pimpinella anisum*)

A dainty annual that grows from 1½ to 2 feet high. It has lobed leaves, finely cut, and very small whitish flowers in flat clusters. The leaves and seeds have a warm sweet taste suggestive of licorice.

Use: The leaves are used in salads and as a garnish. The seeds are used to flavor confections, cakes, cookies, etc. Oil from the seed is used in medicine.

Horticultural Use: Attractive in the herb garden, but of no great ornamental value.

Culture: Grows readily from seed planted after danger of frost is past.

Harvesting: The green leaves can be cut whenever the plants are large enough. The seeds are gathered as soon as they ripen, dried and stored in tight containers.



Burnet grows in neat, rounded clumps.

Burnet (*Poterium sanguisorba*)

A very pretty perennial with graceful compound leaves and oblong flower heads dotted with very small white or rosy flowers. It grows to about 1 foot high.

Use: The leaves have a cool flavor somewhat like that of cucumbers. They are used in salads and in cool drinks.

Horticultural Use: The graceful appearance and pleasant green of burnet leaves

make it a useful plant near the front of a border, especially if the rather untidy flower heads are cut off.

Culture: Grows in any garden soil and is easily raised from seed. Burnet may also be propagated by division.

Harvesting: The fresh leaves are picked as wanted, are best when young.

Rose (*Rosa* spp.)

Roses are not herbs, strictly speaking, but because of the beauty they bring to the herb garden, and because of the long use made of them in cooking and perfumery, they are usually included among the herbs. Those roses notable for their fragrance are the ones most appropriate for the herb garden, and among these the damask rose (*Rosa damascena*) is outstanding. Others are the French rose (*R. gallica*), cabbage rose (*R. centifolia*) and some rugose roses (*R. rugosa*).

Use: Petals are the source of attar of roses, and are used in potpourris, to make jams and jellies, and to give delicate flavor to various desserts. Hips are used for jam.

Horticultural Use and Culture: See *Handbook on Roses*.

Harvesting: Petals should be gathered on sunny day after dew is gone and when flowers are at height of bloom.



Duchesse de Brabant,
an extremely fragrant old tea rose

Rosemary (*Rosmarinus officinalis*)

Half-hardy perennial which is best taken indoors and kept as a pot plant over winter where climates are severe. Grows out-of-doors the year around in mild climates and may reach 3 to 6 feet. The narrow leaves are rather leathery, and have a spicy, resinous fragrance.

Use: A very popular flavoring for meats, dressings, etc. An oil from the leaves is used in medicine.

Horticultural Use: In warm climates rosemary can be used as a hedge. Makes a good specimen plant for growing in pot or tub.

Culture: Grows best in well-drained, sunny situation, in soil containing lime. Propagated by cuttings and can be grown from seed.

Harvesting: Fresh leaves cut at any time; for drying they are best taken just before plant blooms.



Leafy twig of rosemary



Pineapple sage

Pineapple Sage (*Salvia elegans*)

A tender perennial which must be wintered over in pots indoors in cold climates. The semi-woody stems may grow to over 4 feet high. The rough, pointed leaves have a delicious pineapple scent. Inch-long, tubular flowers of a beautiful cardinal-red appear in late summer. Formerly *S. rutilans*.

Use: The fragrant leaves are good in pot-pourris and give a pleasing flavor in cold drinks such as iced tea.

Horticultural Use: Because of its height and tendency to be scraggly, pineapple sage is best planted in the background.

Culture: Does well in any good garden soil. Propagated from cuttings, which will root in water.

Harvesting: Fresh leaves can be picked and dried at any time.



Sage

(*Salvia officinalis*)

Woody hardy perennial with oblong, woolly, gray-green leaves, light below, darker above. Sage grows to 2 feet or more in height and has a tendency to sprawl.

Use: One of the most familiar of seasoning herbs, used with meats, dressings, etc.

Horticultural Use: If cut back from time to time sage is an attractive plant. There are dwarf forms useful for edging, as well as purple-leaved and variegated ones.

Culture: Does best in a light, well-drained soil in a sunny spot. Grows easily from seeds or cuttings.

Harvesting: Leafy tops of stalks are cut about 5 inches long before flowering, hung in open shade until dry.

Clary Sage

(*Salvia sclarea*)

This sage is a biennial, with large, pebbled, scalloped leaves as much as 9 inches long at the base of the plant, becoming smaller as they ascend the 3-foot flowering stalk. The flowers are whitish, in spikes with pinkish or lavender bracts. They have a strong aromatic odor.

Use: The leaves may be eaten in omelettes or as fritters, and are sometimes used to flavor wines, ales and beer. Oil from the seeds is used in perfumes.

Horticultural Use: This handsome plant is decorative toward the back of a border.

Culture: Grows well in any garden soil. Grown from seed. After blooming the second year the plants are replaced.



Flower spike of clary sage, a large handsome plant.



Summer savory

Summer Savory (*Satureja hortensis*)

A tender annual growing to 18 inches or less, with small, bronzy-green leaves and minute white or lavender flowers. The leaves are pungent and spicy.

Use: Summer savory is widely used as a condiment with meats and vegetables. It is generally considered a little sweeter-flavored than winter savory.

Horticultural Use: Not outstanding as an ornamental as the small leaves are sparse and less conspicuous than the stems.

Culture: Grows best in a well-worked loam. Seeds are planted out-of-doors in spring.

Harvesting: Leafy tops are cut when plants are in bud and hung in an airy shaded place until crisp and dry.

Winter Savory (*Satureja montana*)

This hardy perennial has dark green, shining, pointed leaves much stiffer in texture than those of summer savory. The plant is woody and grows up to 2 feet high. It has small white or lavender flowers.

Use: A very good condiment, not as sweet as summer savory. It is also used as a flavoring in some liqueurs.

Horticultural Use: Makes a good low hedge or accent plant.

Culture: Does best in a light sandy soil. Dead wood should be kept trimmed out. It is propagated by cuttings or raised from seed.

Harvesting: The young shoots and leaves may be picked at any time. The leaves are almost evergreen, but not so pungent in winter. They are best dried for winter use.



Gottschalk-Schlesinger

Winter savory in bloom



Mother-of-thyme in blossom between flags in flagstone walk

Mother-of-Thyme

(Thymus serpyllum of the trade)

Prostrate, spreading, shrubby perennial usually only a few inches in height. Small oval leaves and purple flowers. There are varieties with white, rose or crimson flowers, others with yellow- or white-variegated

leaves. Lemon thyme (*T. x citriodorus*) has lemon-scented foliage.

Uses, Culture and Harvesting: Same as for common thyme.

Common Thyme (*Thymus vulgaris*)

Low growing, wiry-stemmed perennial reaching about 6 to 10 inches. The stems are stiff and woody, the leaves small, oval and gray-green. The lilac flowers are borne in small clusters. Leaves are highly aromatic.

Use: A widely used seasoning for food. Oil of thyme is used in medicine and perfumes. Famous as a source of honey.

Horticultural Use: Good as an edging plant or spreading among and over rocks.

Culture: Grows best in light, well-drained soil. It is well to renew the plants every few years. Propagated by cuttings, division and from seed.

Harvesting: Leafy tops and flower clusters cut and dried when first blossoms open.



Common thyme

Nasturtium (*Tropaeolum majus*)

Tender annual with juicy climbing stems and round, light green leaves. One of the most popular garden annuals because of its showy flowers in many shades of red, orange and yellow.

Use: The entire plant has a spicy, peppery flavor and the stems, young leaves and even flowers are used in salads. The green seed pods can be pickled as a substitute for capers.

Horticultural Use: Useful for trailing over rocks. Dwarf nasturtium (*T. minus*) is more useful as a border plant.

Culture: Grows in any good garden soil from seed planted after all danger of frost is over.

Harvesting: Fresh leaves and flower buds can be used at any time. The seed pods are used when full grown but still green.



Nasturtium has edible leaves and flowers.



Sweet violet

Sweet Violet (*Viola odorata*)

Familiar hardy perennial with creeping root-stalks and heart-shaped leaves. There are over 600 kinds of violets known; this species is one of the most fragrant. Blossoms are deep violet and single.

Use: Grown chiefly for the beauty and fragrance of the blossoms. The flowers are occasionally candied and can be used in salads. The plant also is sometimes used medicinally. Perfume is obtained from the flowers, but much so-called "violet" scent comes from orris root.

Horticultural Use: Makes beautiful edging or border plantings. Also useful in partially shaded spots.

Culture: Thrives in poor soils especially in partial shade. Raised from seed or propagated by division.



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Some Nurseries and Seed Houses

Mail-order catalogs or lists, unless noted.

W. Atlee Burpee Co., Warminster, PA 18974. Seeds.
Carroll Gardens, Box 310, 444 E. Main St., Westminster, MD 21157

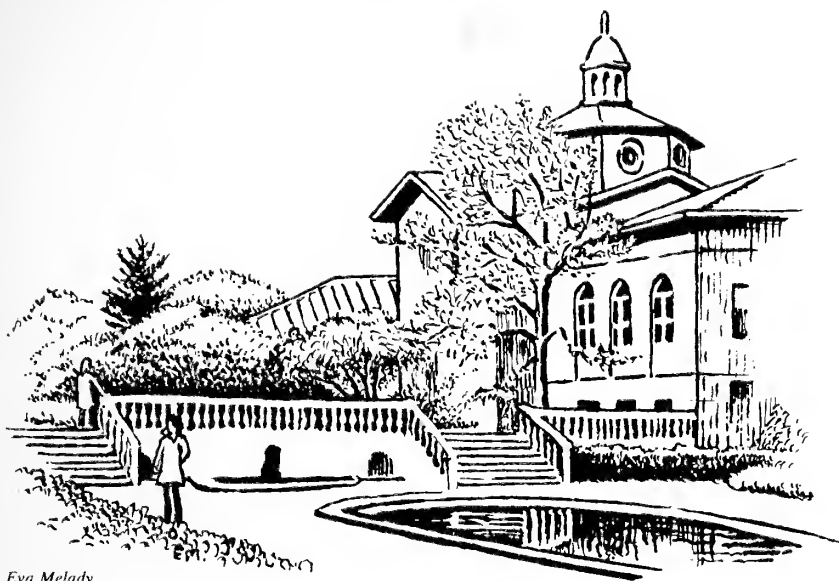
Comstock, Ferre & Co., 263 Main St., Wethersfield, CT 21157. Seeds.
Country Herbs, 3 Maple St., Stockbridge, MA 01262
Flintridge Herb Farm, Rte. 1, Box 187, Sister Bay, WI 54234. Catalog \$1.00.

- Fox Hill Farm, Parma, MI 49269. Catalog \$1.00.
- Gilbertie's Herb Gardens, S. Sylvan Road, Westport, CT 06880. No shipping.
- Joseph Harris Co., Moreton Farm, Rochester, NY 14624. Seeds.
- Hemlock Hill Herb Farm, Litchfield, CT 06759. Catalog 50¢.
- The Herb Cottage, Washington National Cathedral, Mt. St. Albans, Washington, D.C. 20016. Seed catalog 25¢.
- Hilltop Herb Farm, Box 1734, Cleveland, TX 77327. Catalog \$2.00.
- Keil Bros., 220-15 Horace Harding Blvd., Bayside, NY 11364. No shipping.
- Logee's, Greenhouses, 55 North St., Danielson, CT 06239. Catalog \$2.00.
- McFarland House, 5923 Exchange St., McFarland, WI 53558. Catalog \$1.00.
- Milaeger's Gardens, 4838 Douglas Ave., Racine, WI 53402. Catalog \$1.00.
- Nichols Garden Nursery, 1190 N. Pacific Hwy., Albany, OR 97321
- Geo. W. Park Seed Co., Greenwood, SC 29646
- Richter's, Goodwood, Ontario, Canada LOC 1A0. Seed catalog \$1.00.
- Rutland of Kentucky, Box 16, Washington, KY 41096. Catalog \$2.00.
- Stonehedge Gardens, Box 257, RFD 1, Charlton, MA 01507. No shipping.
- Sunnybrook Farms Nursery, 9448 Mayfield Rd., Chesterland, OH 44026. Catalog 50¢.
- Taylor's Herb Gardens, 1535 Lone Oak Rd., Vista, CA 92083
- Tool Shed Herb Farm, Salem Center, Purdys, NY 10578. Catalog 25¢.
- Martin Viette Nurseries, Rte. 25A, East Norwich, NY 11732. No shipping.
- Well-Sweep Herb Farm, 317 Mt. Bethel Rd., Port Murray, NJ 07865. Catalog 50¢. ❧

A Few Books

- Rosetta E. Clarkson. *Herbs, Their Culture and Uses*. Macmillan, New York. 1966.
- Gertrude B. Foster and Rosemary F. Loudon. *Park's Success with Herbs*. Geo. W. Park Seed Co., Greenwood, SC. 1980.
- Helen M. Fox. *Gardening with Herbs for Flavor and Fragrance*. Soft cover reprint. Dover Publications, New York. 1972.
- Sarah Garland. *The Complete Book of Herbs and Spices*. Viking Press, New York. 1979.
- Herb Society of America, eds. *Herbs for Use and Delight: An Anthology from "The Herbarist"*. Soft cover reprint. Dover Publications, New York. 1974.
- Maude Grieve. *A Modern Herbal*, ed. by Mrs. C.F. Leyel. Two vol. Soft cover reprint. Dover Publications, New York. 1971.
- Maude Grieve. *Culinary Herbs and Condiments*. Soft cover reprint. Dover Publications, New York. 1954.
- Mary Page and William T. Stearn. *Culinary Herbs*. Wisley Handbook #16. Soft cover. Royal Horticultural Society, London, England. 1974.
- Eleanor S. Rohde. *Culinary and Salad Herbs*. Soft cover reprint. Dover Publications, New York. 1972.
- Waverley Root et al. *Herbs and Spices: The Pursuit of Flavor*. McGraw-Hill Book Co., New York. 1979.
- Adelma Simmons. *Herb Gardening in Five Seasons*. Soft cover reprint. E.P. Dutton, New York. 1977.
- Malcolm Stuart, ed. *The Encyclopedia of Herbs and Herbalism*. Grosset and Dunlap, New York. 1979.

Do you feel like Sherlock Holmes sleuthing among the angelica? Many excellent books on herbs written earlier this century are out of print and hard to locate. In the absence of a bloodhound, you instead might write to Elizabeth Woodburn, requesting Catalog 480, *Herbs*, a 33-page listing of books she has available on this subject. Enclose \$1.00. Address: Elizabeth Woodburn, Booknoll Farm, Hopewell, NJ 08525. ❧



Eva Melady

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he plants it for posterity.**

—Alexander Smith

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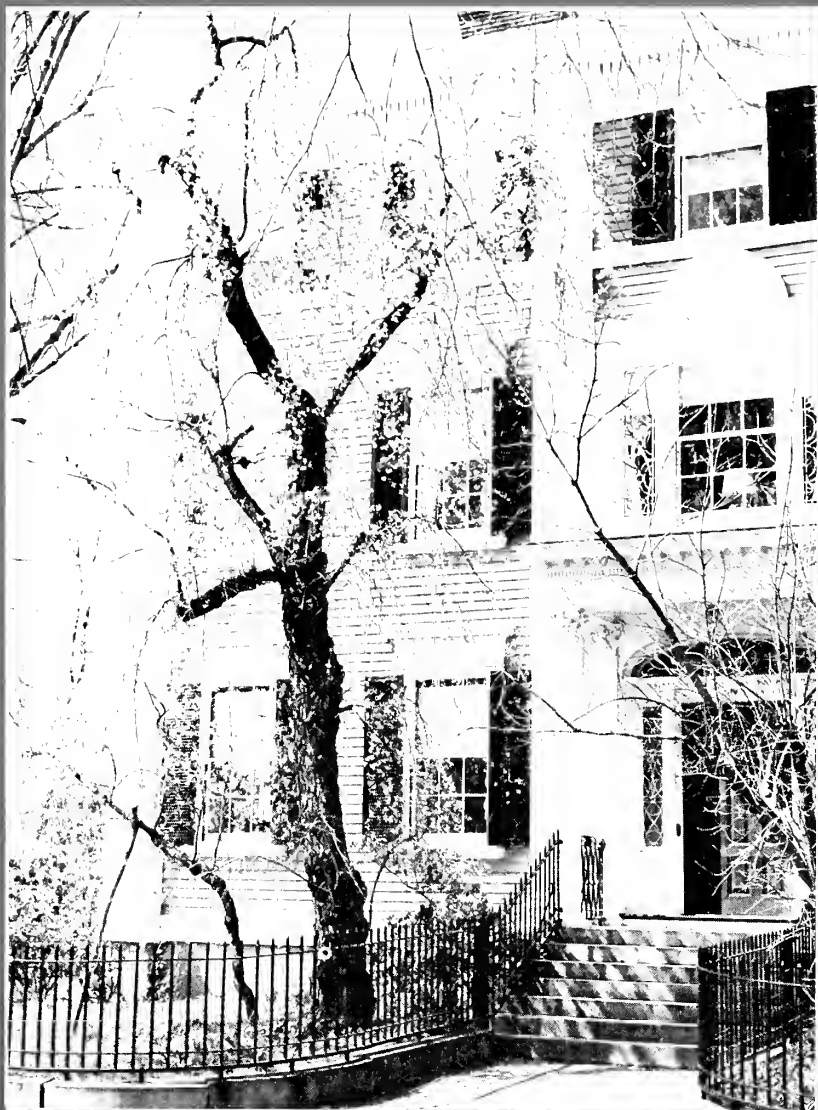
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PLANTS & GARDENS

BROOKLYN BOTANIC GARDEN RECORD

NURSERY SOURCE MANUAL

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LETTER FROM THE BROOKLYN BOTANIC GARDEN

An old standby returns to the BBG series with this issue, the third edition of the BBG woody-plant source manual that I originally compiled in 1969. There have been a number of changes in the nursery trade since the last edition appeared in 1977. As with all businesses, some nurseries have come, others have gone. Also, there are some relatively new plants in the trade, and a few have more-or-less disappeared. It may be of interest that large-growing flowering shrubs have suffered a marked decline in availability and the dwarfs, whether flowering shrubs or conifers, have experienced a sharp rise. In view of our scaled-down landscapes this is not really a surprise.

This new Handbook is the Botanic Garden's continuing response to letters and calls from Members and friends asking "Where can I buy _____?" This is strictly a public-service issue because of the inordinate time and cost involved in preparation, and it is noteworthy that not one of the nurseries cited was asked to pay for inclusion. By the same token, the Botanic Garden as an eleemosynary institution does not endorse any particular firm. The Handbook is simply an attempt to get gardener and nurseryman together concerning 1300 trees and shrubs, some of them rare jewels in danger of disappearance from the trade.

This source manual is not meant as casual bedside reading, although the basic approach of grouping trees and shrubs by major categories (*e.g.*, Deciduous Trees Planted for Foliage, Flowering Trees) may help gardeners and landscape designers get to know the variety of choices available. Essentially it is a reference work, and space limitations have permitted only brief descriptions of plants by the Editor. The main purpose of the Handbook is to make easier the horticulturist's search for particular plants.

Neophyte gardeners should not be dismayed by the extensive use of botanical names. They are the precise horticultural language and will greatly increase your chances of getting exactly the plant you desire. Wherever possible, common names have also been given, but even here it should be said that "common" names often vary according to geographical region. Note that there are separate indices for botanical and common names, beginning on page 86.

All readers are urged to turn to pages 79 and 84 before reading the text. Letter code sources refer to retail or mixed retail-wholesale nurseries, number codes to exclusively wholesale nurseries. The latter are not equipped to sell directly to the home gardener. Unless you are a nurseryman, please do not attempt to purchase plants from strictly wholesale firms.

The source manual, which was my first Handbook as BBG Editor fourteen years ago, is also my last, for I will be retiring shortly to concentrate on several personal pursuits, including a nursery devoted to uncommon perennials. It takes the guidance of many people before a Handbook can go to press, and we owe a word of warm appreciation to all who have helped out. For this edition an extra note of thanks goes to Tom Dilatush of Robbinsville, New Jersey, a very special plantsman-nurseryman who gave many helpful suggestions on conifers, particularly the dwarfs, and on Japanese maples.

Yours for better gardening!

Sincerely,



Editor

BUYING TIPS FOR TREES AND SHRUBS

The enterprising gardener usually purchases plants from a variety of sources—local nurseries, garden centers, landscape enterprises, hobby gardens and mail-order firms. Since the listings of each firm are necessarily limited, it is frequently necessary for the home gardener, and even the landscape specialist and nurseryman, to engage in time-consuming searches for choice and uncommon plants. Often the hunt is a frustrating one, and less satisfactory plants must be substituted for ones originally desired. While the 1,200 woody plants cited in this Handbook by no means include all that exist in the American nursery trade, it is hoped that this edition of *Nursery Source Manual* will make the search easier.

Should specimen-size trees be desired, they are usually best purchased locally, especially if they are balled and burlapped (“B & B”), for the cost and danger of shipping large plants is substantial. Some regional firms that specialize in uncommon species of landscape size are listed in the Handbook, and the horticultural enthusiast must be prepared to drive some distances to obtain such plants if the nursery does not have a truck delivery service in the particular area.

A local nursery may often try to assist you in obtaining larger sizes of uncommon trees. You can assist by providing the wholesale sources of particular plants, cited by number code in the rear of this Handbook. (The telephone can minimize the frustration of such a hunt, especially in the busy season. Telephone numbers along with addresses are given in the Source List beginning on page 79.) However, it is always wise to order far in

advance, since desirable plants are often sold out early in the season.

Many fine shrubs and trees are unavailable locally, but there are mail-order firms that will supply these plants, generally in modest sizes. With the exception of evergreens and a few other plants that nurseries usually ship in pots or with small balls of soil, woody plants are sent bare-root, with plastic wrapping and sphagnum or similar material to keep the roots from drying out. Bare-root plants may be sent only when dormant, that is, in the cooler months of the year. The common shipping seasons, depending on climate, are October to December and March to May.

Because autumn is usually the least busy shipping time in the nursery year, it may be expected that orders receive more attention at that time than in the spring months. The gardener may also be sure that plants shipped in autumn will have been freshly dug. Because of the large volume of business in the short spring season, some large nurseries dig plants in the autumn and store them in cold houses over winter. Although storage methods have improved in recent years, plants often are “worse for wear” from such treatment.

Where the climate permits, generally Zone 5 (Arnold Arboretum map, see Centerfold) and southward, autumn delivery has other advantages as well. Many shrubs and trees planted in fall will become quickly established and make better growth in the ensuing year than those planted in spring. They may also require less watering in summer since their roots will be better established.

Regardless of the time of year a shrub

or tree is planted, it is advisable to mulch it well with pine needles, ground bark, wood chips or similar material (*not* peat moss). Protect with fine mesh wire if rabbits or field mice are common. For planting instructions see any basic gardening book—or BBG *Gardening Guide* Handbook (available from the Garden for \$2.25).

Unless a cold frame is available, spring delivery is normally preferable for very small sizes or for plants of borderline hardiness. Spring planting is advised for a few trees and shrubs in bare-root condition. Most notable are cherries and other members of the genus *Prunus*, golden-rain-tree, tamarisk, broom, rose-of-Sharon, some maples and oaks. Magnolias and tulip-tree, even with a good soil ball, should not be planted in autumn. Very small evergreens are also more safely planted in spring.

Consult your local arboretum or county agent if you are in doubt about an appropriate planting time in your area for a special shrub or tree. A member of the arboretum staff or agent may give more explicit information about the hardiness of a plant in a particular area, since climate zones, while very useful, are but general guides.

Mail-order firms usually ship larger sizes by United Parcel Service, smaller sizes by Parcel Post or sometimes by bus. If one chooses Parcel Post, the extra charge for "special handling" is a

good precaution. When shipments are made across the country, UPS Blue Label is well worth the extra expense.

Most plant losses are due to transit delays, not to faulty packing. Mail-order firms are working with the postal authorities to improve service, which, as gardeners know, has left something to be desired in recent years. It is hoped that the reorganization of the post office will eventually be beneficial to those who order by mail.

A word should also be said about commercial garden centers, which have proliferated around the country in the last ten or fifteen years. Increasingly, the plants they sell are container grown. A good garden center will have a substantial variety of these plants, purchased usually from large wholesale firms. To the home gardener, the chief convenience of such stock is that it extends the planting season beyond the spring limits.

If one purchases container-grown stock in summer, it is wise to wait until a cool, cloudy day before transplanting it to the garden. Be careful to inspect the root ball upon freeing the plant from the container. If roots encircle the outer rim of soil, make several sharp—but not deep—cuts to break the outer white mesh of roots. Otherwise, there is danger of a root system that may eventually girdle and perhaps even kill the plant. It is always wise to remove some top growth to compensate for root loss. ♣

HOW TO USE THIS BOOK

In this Handbook, every effort has been made to evolve as simple a key as possible. The following paragraphs explain the key and various designations used in the plant listings:

Numbers in parentheses after a botanical name refer to hardiness zones—the northern limit of winter hardiness of a tree or shrub. (See Hardiness Map, Centerfold.) “B” after a hardiness code number indicates that the plant is hardy in the southern half of a particular zone. Hardiness varies, even within a species, and depends in part upon micro-climates within each garden.

When hybrid trees or shrubs are cited, the two parents are linked with an “x” in parentheses after the botanical name. For example, the red horse-chestnut is listed botanically as *Aesculus carnea* (*hippocastanum x pavia*).

Parentheses after a botanical name are also used to denote synonymy. *Magnolia virginiana* (*glauca*) indicates that the correct name is *M.* (abbreviation is this instance for *Magnolia virginiana*, but readers may find the tree listed in some catalogs under the incorrect name *M. glauca*. When ordering, give both names.

Letter codes following a description refer to retail (or mixed retail-wholesale) sources. **Number codes** refer to exclu-

sively wholesale sources. For more details see the code explanations beginning on page 79.

The heights attributed to trees and shrubs are considered in terms of average garden conditions. In their native state, or with great age or under special conditions, trees and shrubs may grow taller than the heights cited.

Flowering times are for the New York City area, and they merely represent an average. It is not uncommon, depending on the particular year, for a plant to flower two weeks earlier or two weeks later than usual. Summer flowering time is especially variable. If you know the flowering time of a special shrub or tree in your area, it will be easy to guess when others will be in flower by cross-checking with the “indicator” plant.

An asterisk (*) after the nursery codes indicates that the plant is listed in far too many catalogs to cite fully. One may assume that such plants are among the most common in the trade and can usually be obtained locally with no difficulty. ✻

DECIDUOUS TREES PLANTED FOR FOLIAGE

*Those useful as shade trees marked “†”
Those marked “*” also available at most nurseries
(See also Flowering Trees)*

DECIDUOUS CONIFERS

Larch

***Larix decidua* (europaea) (3-2B)**

EUROPEAN LARCH

Pyramidal tree to about 75 ft., often with gracefully pendulous branchlets at maturity. Fine yellow autumn color. CL, EI, GR, KE, 3, 6, 8, 10, 17, 18, 22.

Selected form: ‘*Pendula*’. ME, OL, SR, 17, 25, 28.

***Larix kaempferi* (leptolepis) (4-3B)**

JAPANESE LARCH

Tall-growing, openly pyramidal tree with horizontal branching. Rather fast-growing. FO, GI, GR, HO, KT, MU, WN.

***Larix occidentalis* (5)**

WESTERN LARCH

Narrowly pyramidal tree with short, horizontal branches. The tallest of the larches, occasionally to over 200 ft. in the Pacific Northwest. BO, FO, VA.

Dawn-redwood

***Metasequoia glyptostroboides* (5-4B)**

Graceful tree, strongly pyramidal. Under favorable conditions it is capable of growing 60 ft. in 20 years. Good reddish-brown autumn color. BO, DA, EI, FI, FO, GR, GU, HO, KE, KL, KR, ME, PA, SR, WG, 5, 6, 8, 10, 11, 15, 16, 17, 20, 22.

Golden-larch

***Pseudolarix kaempferi* (amabilis) (5)**

Fine, tall, openly pyramidal tree with 2-in.-long needles in clusters. Golden-yellow autumn color. Good winter effect with short, stubby spur branches. WN.

Bald-cypress

***Taxodium distichum* (4)**

Densely pyramidal, sometimes nearly columnar, large tree with attractive shredding bark. The woody root-projections or “knees” of this native southern swamp tree occur only in moist

soil. Adaptable to a wide range of growing conditions. Refined small comblike needles. CL, DA, DI, EA, EI, FO, GI, GR, HO, KE, LO, ME, SA, WG, WX, 8, 11, 12, 16, 17, 18, 22.

OTHER DECIDUOUS TREES

Maple

***Acer buergerianum* (6)**

TRIDENT MAPLE

Small, spreading tree to 25–30 ft.; refined habit. Short, 3-lobed leaves turn red in autumn. Leaves vary in size; forms with smaller leaves are good bonsai candidates. GI, GO, GR, HR, KT, ME, 19.

Selected forms, mostly for bonsai: HR, KT.

***Acer campestre* (5-4B)**

HEDGE MAPLE

Rather slow-growing, round-headed tree, eventually to about 25 ft. Because of its small leaves and dense habit, it is often used in Europe as a clipped hedge. BO, DU, EI, KE, 8, 10, 14, 17, 18, 26.

Selected form: ‘*Compactum*’. DI, GR.

***Acer circinatum* (5)**

VINE MAPLE

Shrubby small tree from the West Coast, rather like *A. palmatum*. Attractive in flower. Good autumn color. Tolerates partial shade. BO, BR, FO, GR, KE, SI, YE, 26.

***Acer davidii* (6B)**

DAVID MAPLE

Small to medium-sized tree from China. Younger wood, striped white, is effective in winter. Leaves mostly unlobed. BO, GR, KT, 18.

***Acer ginnala* (2)**

AMUR MAPLE

Dense shrubby tree to 15–20 ft. Small leaves turn brilliant scarlet in autumn. A good hedge plant in cold climates. EI, FI, FO, GU, HO, HR, IT, KE, KR, ME, PA, VA, WB, WN, 6, 8, 10, 11, 12, 16, 17, 18, 21, 22.

***Acer griseum* (5)**

PAPER-BARK MAPLE

Superb small tree with outstanding cinnamon-colored, peeling bark. This species from western



Japanese maples (*Acer palmatum*) are handsome slow-growing small trees. Texture varies from a typical maple leaf to thread-leaved and color from green to red and purple. Branch structure is often worth exposing by judicious pruning.

China has year-round interest. Leaves trifoliate. BO, CL, DI, FX, GI, GO, GR, KE, KT, OL, SR, 5, 7, 10, 15, 17, 22.

Acer japonicum 'Aconitifolium' (5)

HALF-MOON MAPLE

Small tree with distinctively cut leaves that have fine red autumn color. Variable but usually very handsome. FX, GR, HR, HU, KE, KT, OL, WN, 7, 15, 20, 28.

Acer japonicum 'Aureum' (5)

GOLDEN FULL-MOON MAPLE

Small tree with yellow leaves. More attractive than most with such foliage. GR, HR, HU, KE, KT, MA.

†Acer negundo (2)

BOX-ELDER

A weedy maple to 50 or 60 ft. with large compound leaves. Suited only for cold, windy areas where other trees fail. AE, KE, VA.

Selected form: 'Variegatum'. Handsome tree with variegated-silver leaves. 26.

†Acer nikoense (6-5B)

NIKKO MAPLE

Rather slow-growing, vase-shaped, eventually to 40 ft. or more. The trifoliate leaves have good red-to-purple autumn color. Now considered

synonymous with *A. maximowiczianum*. KT.

Acer palmatum (4) (some forms less hardy)

JAPANESE MAPLE

A variable but always attractive slow-growing small tree or shrub. Refined small leaves with usually good red autumn color about two weeks later than native maples. Japanese maple and its many forms are prime bonsai candidates.

Selected forms: 'Atrosanguineum'. PURPLE-LEAF JAPANESE MAPLE. AL, BR, CL, DA, EI, GI, KE, KR, MC, ME, OL, WN, 5, 6, 10, 14, 16, 20, 22, 25.

'Beni-Komachi'. DI, GR, HR, HU, KT, MA.

'Burgundy Lace'. Cut-leaf form with reddish-purple leaves. GR, HR, HU, KE, KT, MA, SR, 14, 20, 26, 28.

'Butterfly'. Variegated. DI, FX, GO, GR, HU, KT, MA, OL, 28.

'Dissectum'. THREAD-LEAF JAPANESE MAPLE. Slow-growing dense mound, usually broader than tall. Leaves deeply, cut, almost shredded. DA, DI, KE, SR, 5, 7, 10, 14, 18, 22, 25, 26, 28.

'Okushimo'. DI, GR, HR, HU, KT, MA, 28.

'Orido-Nishiki'. GR, HU, KT, MA.

'Ornatum' ('Dissectum Atropurpureum'). BR, CL, DA, FX, HR, KE, KT, ME, SR, 6, 8, 10, 18, 25, 26, 28.

'Oshio-Beni'. FX, GR, HR, HU, KE, KT, MA, SR, WN, 14, 20, 26.

'Sangokaku' (**'Senkaki'**). Brilliant red winter twigs. DI, FX, GR, HR, JU, KE, KT, MA, WG, 15, 26.

'Seiryu'. Upright, green cut-leaf form. DI, GR, HR, HU, MA.

'Shishigashira' (**6-5B?**). Exceptionally slow-growing form with very small leaves. Perhaps the best form for bonsai. DI, GR, HR, HU, KE, KT, MA, 28, 29.

Acer pensylvanicum (3)

STRIPED MAPLE, MOOSEWOOD

Small but vigorous shade-tolerant tree, primarily associated with cooler parts of the North. Branchlets green with white stripes. Large, slightly coarse leaves. EI, 18.

†Acer platanoides (3)

NORWAY MAPLE

Broadly rounded tree to 90 ft. with large lobed leaves casting dense shade. Little autumn color. Tolerates diverse conditions but does not thrive as a street tree in New York. A prolific seeder. Many forms are more tender than the species.

Selected forms: **'Columnare'**. A 40-ft. tree may have a 24-ft. spread. Ascending branches. EI, HO, KE, PL, WB, WN, 6, 10, 11, 18, 21, 22.

'Crimson King' (5). Leaves deep purple through summer. BU, CR, DA, EI, FI, GU, HO, IT, KE, KL, KR, MC, ST, 3, 6, 8, 10, 11, 16, 17.

'Crimson Sentry'. Columnar. FI, IT, WN, 6.

'Drummondii', (**'Harlequin'**). Leaves edged white. Foliage reversion to green is common. Handsome. CO, EI, FI, KR, MC, ME, 6, 8, 18, 21, 26.

'Emerald Queen'. Fast-growing, with broadly ascending branches and shiny dark green leaves. CR, FI, IT, JU, KE, MC, 8, 10, 11, 16, 17, 21, 22, 26.

'Globosum'. Small globe-shaped tree more suitable than the species for planting under utility wires. 6.

'Greenlace'. Attractive cut-leaf form. 8.

'Schwedleri'. Leaves open purple in spring, turn deep green by early summer. Attractive because of seasonal changes. EI, HO, JU, KE, PL, ST, WN, 6, 8, 10, 17, 18, 21, 22, 26.

'Summershade'. Said to have deep green leathery foliage resistant to heat and windburn. EI, 6, 16, 22, 26.

†Acer pseudoplatanus (5)

SYCAMORE MAPLE

Coarse, large-leaved, broad-headed tree to 60 ft. or more. Tolerates coastal conditions. Poor autumn color. A prolific seeder. EI, HU, WN, 8, 10, 18, 22.

Selected form: **'Spaethii'**. Leaves purplish-red beneath. WN, 8, 10.

†Acer rubrum (3)

RED, SCARLET OR SWAMP MAPLE

Eventually tall-growing tree, often with rounded

habit. Conspicuous in flower in early spring. Early autumn coloration is usually a good red. Most nurseries.

Selected forms: **'Armstrong'**. Very narrow growth habit. EI, WN, 10, 11, 17, 26.

'Columnare'. DA, KE, 8, 16, 22.

'October Glory'. With crimson autumn foliage several weeks after others have shed their leaves. KE, KR, ME, WB, WN, 8, 10, 16, 21, 22, 26.

'Red Sunset'. CR, MC, PL, WG, WN, 8, 16, 17, 26.

Acer rufinerve (5)

RED-VEIN MAPLE

Spreading tree to about 30 ft. Attractive 3-lobed, dark green leaves turn crimson in autumn. GO, KT.

†Acer saccharinum (dasycarpum) (3)

SILVER MAPLE

Tall fast-growing tree with brittle branches. Handsome, deeply lobed green leaves, whitish beneath. Of little value where better trees can be grown. Primarily for cold, windy areas. Re-seeds prolifically. Most nurseries.

Selected forms: **'Laciniatum'** (**'Wieri'**). Cut-leaved, with graceful pendulous branches. 8, 17, 18, 21.

'Silver Queen'. Seedless. BU, FI, GU, IT, KL, KR, MC, WN, 17, 21.

†Acer saccharum (3)

SUGAR MAPLE

Tall-growing tree with generally oval habit and rough gray bark. Autumn color variable but often brilliant orange-red. It provides the backbone of the New England autumn. There are better maples for urban conditions. Most nurseries.

Selected forms: **'Green Mountain'**. Said to be more tolerant of windy sites because of its thick, waxy, dark green leaves. CR, EI, OL, WN, 8, 16, 17, 22, 26.

'Newton Sentry' (**'Columnare'**) (4). Superb very narrow form. DA, 8, 10, 16, 17, 22.

'Temple's Upright' (**'Monumentale'**) (4). Excellent narrow-growing form without a central leader. EI, WN, 10, 22.

Acer tataricum (4)

TATARIAN MAPLE

Small tree with bright green leaves and yellow-to-red autumn coloring. KT, VA, 10.

Tree-of-heaven, Ailanthus

†Ailanthus altissima (4)

A common weed tree of American cities, suited for only the most difficult sites. FO, 10.

Alder

Alnus cordata (5)

ITALIAN ALDER

Small- to medium-sized tree with shiny heart-

shaped leaves. Attractive catkins in late winter. Suited for moist sites, but where there is good drainage better trees may be selected. 8, 20.

***Alnus glutinosa* (3)**

EUROPEAN ALDER

Round-headed tree of medium size. Leaves retained far into autumn. For moist sites. Several graceful cut-leaf alder forms exist, but they have been slow to come into the trade. ME, 8, 17, 20.

†***Alnus rhombifolia* (5)**

CALIFORNIA WHITE ALDER

Rounded tree to 60 ft. or more, with dense foliage. Suited for moist locations on the West Coast. FO, YE, 20.

Bawpaw

***Asimina triloba* (5)**

Small tree or occasionally a multi-stemmed shrub with drooping leaves 6–12-in.-long. Of interest mainly for its 2–3-in.-long edible fruits, which led an enterprising nurseryman to call it “Michigan banana tree.” It is a member of the largely tropical custard-apple family. DU, EA, FI, FO, GU, LO, ME, SA, 11.

Birch

***Betula albo-sinensis septentrionalis* (5)**

CHINESE PAPER BIRCH

Large rounded tree with splendid orange-brown peeling bark. 15.

***Betula allegheniensis (lutea)* (3)**

YELLOW BIRCH

Tree to 60–70 ft. with broad open head and silvery yellow bark. Native to much of the Northeast and best grown in cool areas. 8.

†***Betula lenta* (3)**

SWEET BIRCH

Pyramidal tree to about 50 ft. Brownish-red-to-black cherry-like bark. Good yellow autumn color. DU.

***Betula maximowicziana* (5)**

MONARCH BIRCH

Upright spreading tree to 50 ft. or more. Attractive yellowish-white bark and the largest leaves of any birch. Borer-resistant. Some trees in the trade are hybrids. BR, KR, WN, 2, 14, 16, 17, 20, 21.

***Betula nigra* (4)**

RIVER BIRCH

Graceful, more-or-less pyramidal tree to about 50 ft. Peeling bark, dull reddish-white to black. Grows well on moist sites. Greater heat tolerance than most birches. DU, EI, FO, HO, IT, LO, PL, SA, SR, WN, 8, 11, 12, 17, 18, 21, 23, 26. *Selected form:* ‘Heritage’. Conspicuous flaking bark. ME, WG, 17.

†***Betula papyrifera* (2)**

CANOE OR PAPER BIRCH

Splendid, eventually tall-growing tree with pure white peeling bark. Usually pyramidal. Not for urban areas. CR, EI, FO, JU, KE, ME, MU, OL, PA, SR, VA, WG, WN, 6, 8, 10, 14, 16, 17, 18, 21, 22.

***Betula pendula (alba) (verrucosa)* (3)**

EUROPEAN WHITE BIRCH

Graceful medium-sized tree with white bark and somewhat pendulous branches. Often sold in clump form. Like most other birches, it is pest-prone. Borers are a major problem. Systemic insecticides may be used to control birch-leaf miner. Most nurseries.

Selected forms: ‘Fastigiata’. Strongly columnar. OL, WN, 6, 10, 22, 26, 28.

‘Gracilis’ (‘Laciniata’). CUT-LEAF EUROPEAN BIRCH. Delicate small tree with slender weeping branches and finely dissected leaves. BU, EI, FI, IT, JU, KL, KR, MC, MI, PL, SR, VA, WN, 3, 6, 8, 10, 11, 18, 21, 26.

‘Purpurea’. WN, 6, 29.

‘Youngii’. YOUNG’S WEEPING BIRCH. Asymmetrical weeping form. Should be staked while young. FX, GR, KE, ME, OL, SR, VA, WN, 3, 6, 18, 26, 28.

***Betula platyphylla japonica* (4)**

JAPANESE WHITE BIRCH

Similar to *B. papyrifera* but more spreading and stoutly branched. Borer-resistant. FI, JU, SR, VA, 5, 20.

***Betula populifolia* (4)**

GRAY BIRCH

Usually a multi-stemmed small tree, common to abandoned fields in New England. The dull gray-white bark is attractive, but few old specimens are seen. Tolerant of poor, moist soil. Often infested with birch-leaf miner. DI, GI, KE, 18.

Hornbeam

†***Carpinus betulus* (5-4B)**

EUROPEAN HORNBEAM

Medium- to large-sized spreading tree with strong, sometimes ascending branches. Attractive beechlike bark, but darker gray and sinewy. EI, KE, SR, WG, WN, 10, 18, 22.

Selected form: ‘Fastigiata’. Columnar in youth; older trees become vase-shaped. EI, HO, 8, 18, 22, 26.

***Carpinus caroliniana* (3-2B)**

AMERICAN HORNBEAM, IRONWOOD

Small tree, occasionally shrubby, with smooth, sinewy, bright gray bark. Good orange or red autumn color. DU, FO, HO, KR, ME, SA, WU, WX, 8, 14.

Pecan, Hickory

†***Carya illinoensis* (pecan) (5)**

PECAN

The tallest hickory, with massive branching habit and compound leaves that may be 18 or 20 in. long. While hardy northward, it is a dependable nut producer only in the South. Numerous forms exist, selected for their nuts and relative hardiness. BU, CA, DU, EA, FI, GU, KL, KR, ME, ST, WB, 11, 14.

†*Carya ovata* (4-3B)

SHAGBARK HICKORY

Very slow-growing, upright, often narrow tree to 75 ft. Noted for its loose plates of gray bark and edible nuts. Difficult to transplant. EA, GU, ME, ST, 8.

Chinese Toon

Cedrela sinensis (5)

Similar in habit and foliage to *ailanthus*, but taller, almost stately at maturity, and nonweedy. Good pest resistance. Street-tree candidate. WX.

Hackberry

Celtis occidentalis (4-3B)

COMMON HACKBERRY

Round-headed tree, often small because of witches'-brooms (short twiggy growths) that contribute some winter character to the outline of the tree. Blistery gray bark. EI, FI, KE, MC, ME, PL, VA, WB, 8, 10, 14, 17, 18, 21, 22.

Katsura-tree

Cercidiphyllum japonicum (4)

Frequently a spreading multi-stemmed tree growing to 45 ft. or more. Massive at maturity. Trained to a single trunk, it may form a narrow tree for some time. Fine-textured, small bluish-green leaves and yellow-to-scarlet autumn color. A variable species, some trees much more attractive than others. Avoid dry soils. BO, DA, DU, EI, GO, GR, HR, KE, LO, ME, SR, WG, WN, 6, 8, 10, 17, 18, 22.

Turkish Hazelnut

†*Corylus colurna* (4)

Sturdy, broadly pyramidal tree to 45 ft. or more. Fairly clean foliage that in time casts a deep shade. Catkins provide interest in late winter. Nuts, when produced, are often unnoticed, except by squirrels. HO, 17.

Persimmon

Diospyros kaki (7)

KAKI OR JAPANESE PERSIMMON

Small to medium-sized tree with rounded head and lustrous dark green leaves that often have good autumn color. The ornamental orange fruit is edible, many commercial varieties having been

selected over the years. While dioecious, some forms produce fruit without pollination. BU, CA, EA, LO, ME, WB.

Diospyros virginiana (5)

COMMON PERSIMMON

A horizontally branched tree that may, under excellent conditions, grow to 70 ft. or more in the South, usually much less in the North. Sometimes more-or-less shrubby. Narrow growth habit while young. Glossy dark green leaves and small, edible fruit. Mainly of use in wild-life plantings. EA, FI, FO, GU, LO, ME, SA, WB, 11.

Russian-olive

Elaeagnus angustifolia (3)

Small spreading tree or large shrub with fine gray foliage much like that of the true olive. A useful tree for contrast, and especially attractive when planted near purple-leaved trees. Drought-resistant. Tolerant of a wide range of soil conditions. BR, BU, FO, KE, KL, KR, MC, OL, ST, WB, WG, 6, 8, 10, 11, 12, 14, 17, 21.*

For other *Elaeagnus*, see page 51.

Hardy Rubber-tree

†*Eucommia ulmoides* (5)

Medium-sized dioecious tree with stoutly spreading branches and lustrous elmlike foliage. The rubber content, of little economic importance, may be seen if a leaf is gently broken. Few apparent insect pests. FO, WN, 22.

Beech

†*Fagus grandifolia* (americana) (3)

AMERICAN BEECH

A beautiful tall-growing tree with smooth, silvery-gray bark and shiny, leathery, coarsely serrate leaves that turn pigskin-brown after many other trees have shed their foliage in autumn. Unlike European beech it will often have root sprouts. DA, EA, EI, KE, ME, PR, SA, SR, WB, WN, WX, 8, 10, 11, 18, 22.

†*Fagus sylvatica* (5-4B)

EUROPEAN BEECH

Tolerant of a wider range of growing conditions than American beech, the European species has slightly deeper gray bark and smaller leaves. It is extraordinarily variable. European beech and many of its forms are among the most handsome large trees hardy in the North. BR, DA, EI, KR, PR, SR, WN, 8, 10, 14, 18, 22, 26.

Selected forms: '*Asplenifolia*'. FERN-LEAF BEECH. One of the most attractive—and robust—trees with deeply cut foliage. It is very dense for many years and some of the secondary branches might best be pruned to provide an opening so the gray bark may be seen. CO, EI, GR, SR, WN, 8, 10, 14, 18, 26, 28.

'Fastigiata'. COLUMNAR BEECH. Narrow-growing form to 25 ft. or more. CO, DA, EI, FX, GI, KE, WN, 8, 10, 14, 18, 22, 26, 28.

Var. **'pendula'**. WEEPING BEECH. Old specimens that have been given ample room to develop are magnificent trees. The form encountered most frequently in America is usually as broad as tall and may attain a height of 45 ft. or more. In Europe a tall, narrow-growing, pendulous form is more often seen. While an occasional old specimen may be seen on estates here, this latter form does not appear to be distinguished in the American trade. It is well suited for today's gardens. CO, DA, EI, FX, KE, KR, ME, OL, SR, WN, 8, 10, 14, 22, 28.

'Purpurea Pendula'. PURPLE WEEPING BEECH. Small tree to 10 or 15 ft., height dependent on where grafted. It forms a neat dome much like Teas weeping mulberry. CO, DA, EI, FX, GR, KE, KR, ME, OL, WN, 7, 8, 10, 18, 28.

'Riversii'. RIVERS PURPLE BEECH. Young foliage greenish-red but becoming purplish-black as the season progresses. CO, CR, DA, EI, HO, KE, KL, KR, ME, PR, SR, WG, 6, 8, 10, 14, 18, 22, 26, 28.

'Rohanii'. CUT-LEAF PURPLE BEECH. Sizable with age. EI, GI, WN, 8, 14, 28.

'Rotundifolia'. Small coinlike leaves. Less vigorous than others, but trees of 50 ft. or more are known. CO, GI, 28.

'Tricolor'. TRICOLOR BEECH. Novelty form with pink, white and green leaf color. Less vigorous than other forms. More-or-less bushy in youth. CL, CO, DA, EI, FX, GI, GR, KE, ME, OL, PR, WG, 6, 8, 18, 28.

Common Fig

Ficus carica (6)

Small shrubby tree with wide coarse leaves of tropical appearance. Evergreen southwards. Needs protected site in North. EA, GU, KL, KR, ME, MI, ST, WB, 20.

Ash

†Fraxinus americana (3)

WHITE ASH

Fast-growing, rather weedy, tall tree, often with an oval crown that is handsome at maturity. Although the wood is used for baseball bats, the brittle twigs may produce constant litter on lawns. Primarily for cold climates where better trees cannot be grown, or for situations where an immediate effect is needed. Most nurseries.

Selected forms: **'Autumn Purple'**. EI, FI, ME, WN, 8, 17, 20, 21, 22, 26.

'Rosehill'. Seedless. WN, 8, 22, 26.

†Fraxinus excelsior (5-4B)

EUROPEAN ASH

Tall round-headed tree without the good yellow-

low-purple autumn color of white ash, but somewhat more refined.

Selected form: **'Pendula'**. WEEPING EUROPEAN ASH. Picturesque, strongly weeping small tree. Effective in winter. GI, 8.

Fraxinus holotricha 'Moraine' (5)

MORAINÉ ASH

Much smaller tree—to about 35 ft.—than American or white ash. Vigorous. Few seeds produced. EI, WN, 26.

Fraxinus pennsylvanica (3)

GREEN ASH, RED ASH

Tree to about 45 ft. with rounded crown. Like white ash, fast-growing and tolerant of a wide range of conditions. Best for the Plains States. Most nurseries.

Selected forms: **'Marshall's Seedless'**. EI, FI, GI, GU, HO, IT, KL, MC, PL, WB, WN, 8, 10, 11, 16, 17, 18, 21, 22, 26.

'Summit'. Straight trunk. EI, JU, KR, WN, 3, 6, 8, 17, 21, 22.

Fraxinus quadrangulata (3)

BLUE ASH

Medium-to-tall tree with narrow crown, corky 4-winged twigs and deep green leaves. 8, 17.

For other Ash, see page 29.

Ginkgo, Maidenhair-tree

†Ginkgo biloba (4)

Eventually tall-growing tree with small leaves shaped like duck feet. Asymmetrical, sometimes gawky branching. Usually good yellow autumn color. Tolerant of a wide range of growing conditions. Gardeners should seek out staminate (male) forms, for the fruit on pistillate trees has a foul odor when crushed. FI, GI, KE, KL, KR, LA, LO, ME, PA, SR, 3, 6, 8, 11, 12, 14, 16, 17, 18, 22.*

Selected forms: **'Autumn Gold'**. Good autumn color. Staminate. GI, WG, 20.

'Fastigiata'. Narrow tall-growing form with strongly ascending branches. Usually staminate. EI, GI, KE, ME, PR, 22, 29.

'Pendula'. Small spreading tree with pendulous branches. Mainly for the collector. GI.

Thornless Honey Locust

Gleditsia triacanthos inermis (4)

Rapidly-growing medium-sized tree with upright or spreading form. Rather small, refined compound leaves provide a light, airy effect. Tolerant of a wide range of growing conditions. While not pest-free, it is often planted in cities as a replacement for the American elm, although there is no resemblance. Numerous seedless or nearly seedless forms, differing slightly, exist in the trade. Best purchased in its forms.

Selected forms: **'Imperial'**. With straight trunk. CR, EI, HO, WB, WN, 6, 8, 11, 17, 26.



Gottschick-Schlesner

The Kentucky coffee-tree (*Gymnocladus dioica*), here shown as it leafs out, is noted for its strong winter outline.

'Moraine'. Wide-spreading. EI, KE, MC, WN, 8, 10, 11, 18, 21, 26.

'Rubylace'. New growth red. Best seen before purchased. GU, MC, ME, 22.

'Shademaster'. Upright. DA, KE, KL, MC, MI, PL, SR, WB, WN, 3, 6, 8, 10, 11, 16, 17, 21, 22.*

'Skyline'. Pyramidal. EI, PL, WB, WN, 6, 8, 10, 11, 16, 17, 21, 26.

'Sunburst'. New foliage golden yellow. Best seen before purchased. EI, GU, IT, JU, KE, KL, KR, MC, ME, MI, SR, 3, 6, 8, 10, 11, 16, 26.*

Kentucky Coffee-tree

†*Gymnocladus dioica* (4-3B)

Tree to 50 ft. or more, noted for its stark winter outline. The large, doubly-compound leaves appear late in spring and drop early in autumn. Conspicuous leather-brown pods, produced only on pistillate trees, contain seeds once used as a coffee substitute. DU, EI, HO, ME, PR, VA, WB, WN, 6, 8, 17, 18, 21, 22.

Idesia

Idesia polycarpa (chinensis) (6)

Medium-sized tree of fairly upright habit, to 45 ft. or more. Leaves coarse, resembling a small catalpa. Usually dioecious but specimens with both sexes are known. Loose panicles of orange-red berries are briefly showy in autumn, beloved by squirrels. FO, WX.

Butternut, Walnut

†*Juglans cinerea* (3)

BUTTERNUT

Short-trunked, spreading, medium-sized tree with compound leaves. Grown occasionally for its nuts. BU, EA, EI, FI, GU, KL, KR, ME, MI, ST, VA, WN, 8, 11, 17.

†*Juglans nigra* (4-3B)

BLACK WALNUT

Tree to 60 ft. or more, similar to *J. cinerea* except for its nuts. While old trees are often picturesque, they are not good lawn trees because of their messy fruit. EI, FI, GI, GU, KE, KL, KR, MC, ME, MI, MU, ST, VA, WB, 8, 11, 17. *Selected form*: **'Thomas'**. Better nuts. BU, EA, GU, MC, ME, MI, ST, WB.

†*Juglans regia* (6-5B)

ENGLISH OR PERSIAN WALNUT

Broad-headed tree to 60 ft. or more. Grayish bark and coarse compound leaves. Many forms exist. CA.

Selected form: **Carpathian Strain (5)**. Hardier than the species. BU, DA, EA, FI, JU, KL, KR, ME, MI, ST, WB, WN, 8, 21.

Sweet Gum

†*Liquidambar styraciflua* (4)

AMERICAN SWEET GUM

Broadly pyramidal tree to 60 ft. or more with attractive lobed leaves that often turn a fine red in autumn. Gum "balls" used in winter decorations. BR, GI, HR, KE, KR, ME, PR, SR, WB, WN, 8, 10, 11, 12, 14, 16, 18, 20, 26.*

*Selected forms: 'Palo Alto'. 20.
'Variegata'. CO, GI.*

Osage-orange

Maclura pomifera (6)

Usually a small, irregularly spreading tree with orange-brown bark. Old specimens may sometimes attain 60 ft. or more. Once a popular hedge plant because of its glossy foliage, thorny twigs and suckering habit. Curious, baseball-sized, yellow-green fruit on pistillate trees. DU, FO, LO, ME, MU.

Mulberry

Morus alba (4)

WHITE MULBERRY

Round-topped small tree with bright green leaves. Of use only on difficult sites or for wild-life plantings. Pistillate trees, bearing messy purple-to-white fruits, should not be planted near paths. Except for ailanthus, white mulberry is the most common weed tree in New York City. DU, KE, 18, 20.

Selected forms: Fruitless clones. Useful mainly in air-polluted areas. FI, LO.

'Chaparral'. A fruitless weeping clone. 10, 20.

'Pendula'. TEAS WEEPING MULBERRY. Strongly pendulous, dense, small tree, height depending on where grafted. Despite messy fruit, this once popular tree still has "architectural" merit. KE, WN, 6, 10, 17.

Var. *tatarica*. RUSSIAN MULBERRY. Small fruits. Apparently harder than the species. Useful wild-life tree. DU, EA, FI, MC, ME, MI, WN, 10.

Sour Gum, Pepperidge-tree, Tupelo

†Nyssa sylvatica (4)

Fairly narrow tree to 50 ft. or more with horizontal, often slightly pendulous branches. Lustrous green leaves turn brilliant purple or scarlet in early autumn. Advisable to plant only young or frequently root-pruned specimens. BO, FO, GO, HO, KE, KR, LO, ME, SA, WB, WN, 8, 12, 14, 16, 18, 20, 22.*

Hop-hornbeam

†Ostrya virginiana (4-3B)

Relatively slow-growing, broadly pyramidal tree to about 45 ft. Light yellow fruits are cone-like from a distance. Fairly pest-free. DU, FO, HO, PR, WX, 6, 8, 16, 17, 18, 22.

Parrotia

Parrotia persica (5)

Shrublike spreading tree that may after many years attain 40 ft. or more. Massive at maturity. Conspicuous mottled bark much like Stewartia.

Small red witch-hazellike flowers in very early spring, often not borne in colder areas. Excellent scarlet-to-yellow autumn color. BO, DA, GO, 15.

Amur Cork-tree

†Phellodendron amurense (4-3B)

Spreading, stoutly-branched tree to 35 or 40 ft. Gray, corklike bark and rather coarse compound leaves. Fast-growing. Old trees are imposing in winter. DU, EI, FO, KE, ME, VA, WB, WN, 8, 10, 18, 22.

Chinese Pistache

Pistacia chinensis (6)

Broadly rounded medium-sized tree with short trunk. Refined, fairly small compound leaves turning vivid orange-red in autumn. GO, HR, LO, WX, 20.

Plane-tree, Sycamore

†Platanus acerifolia (occidentalis x orientalis) (5)

LONDON PLANE-TREE

Tall, ultimately wide-spreading tree with attractive flaky outer bark. While anthracnose has diminished its utility in some areas, it is still one of the most valuable large street trees. Tolerant of an amazingly wide range of growing conditions. Incorrectly called *P. orientalis* in some catalogs. True *P. orientalis* is seldom encountered in American gardens. CR, HO, KE, KL, KR, SR, WN, 3, 6, 8, 10, 17, 18.*

Selected form: Bloodgood Strain. Reportedly resistant to anthracnose. EI, 11, 16, 22, 26.

†Platanus occidentalis (5-4B)

SYCAMORE, BUTTON-WOOD

Probably the most massive—although not the tallest—deciduous tree of North America. While the upper parts of the sycamore often have more silvery bark than the London plane, it is not as adaptable in cultivation, nor is it as pest-resistant. Anthracnose is a major problem. FI, HO, KE, KR, LO, MC, ME, PL, WB, 11, 12, 22.

Poplar

Populus alba (3)

WHITE POPLAR

Tall, irregularly open tree with maplelike leaves, whitish beneath. All poplars are fast-growing and weak-wooded. While often attractive, they are useful mainly in the northern Plains States where growing conditions or drainage is poor. Recently, interest in them has risen because of their resistance to air pollution, but unless planted in parks, they are not good city trees. They should never be planted near sewer or water lines. KE, LO, VA, 18, 21.

Selected forms: 'Nivea'. SILVER POPLAR.
Leaves silvery white beneath, attractive in a breeze. 8.

'Pyramidalis' ('Bolleana'). BOLLEANA POPLAR.
Handsome narrow columnar tree to 50 ft. or more. Perhaps the best columnar poplar. FI, GU, JU, MC, ME, WB, 6, 8, 10, 11, 18, 21, 22, 26.

Populus canadensis 'Eugenei' (deltoides x nigra) (4)

CAROLINA POPLAR

Tall wide-spreading tree of rapid growth. A poor lawn tree because of constant twig fall. 6.

Populus deltoides 'Siouxland' (2)

COTTONLESS COTTONWOOD

Ultimately a large spreading upright tree. Fruitless, hence the common name. GU, JU, MC, PL, 21.

†Populus maximowiczii (4)

JAPANESE POPLAR

Tall tree, wide-spreading branches and dark green leaves, whitish beneath. 22.

Populus nigra 'Italica' (4-3B)

LOMBARDY POPLAR

Graceful tall sentinel, useful for a quick screen, but short-lived. Canker-prone. BU, FI, GI, KE, KL, KR, ME, MI, MU, ST, WN, 10, 11, 12, 17, 20, 22, 26.*

Populus nigra 'Thevestina' (4-3B)

THEVES POPLAR

With the general habit of Lombardy poplar, but reported to be somewhat more pest-resistant. IT, ME, 6, 21.

Populus simonii (4-3B)

SIMON OR CHINESE POPLAR

Handsome pyramidal tree to 35 or 40 ft. Small bright green leaves. One of the most attractive species. WB.

Selected form: 'Fastigiata'. Narrowly columnar, although neither as columnar nor as tall as Lombardy poplar. 10, 22.

Populus tremuloides (1)

QUAKING ASPEN

Often a rather small tree with oval or rounded form. Occasionally to 90 ft. in favorable parts of its immense natural range (Newfoundland to Alaska and northern Mexico). Handsome in a grove or near water. Bark smooth grayish-white. The attractive small leaves flutter in the slightest breeze. FO, ME, MU, SI, VA, YE, 6, 8, 17, 21.

Plum, Choke-cherry

Prunus blireiana (cerasifera 'Atropurpurea' x mume) (5)

BLIREIANA PLUM

Rounded tree to about 20 ft. with reddish-purple leaves. Double light pink flowers in early mid-spring. ME, 21, 26.

Selected form: 'Newport'. Leaves dark purple.

EI, FI, HO, KL, KR, MC, ME, SR, 12, 16, 18, 21, 26.

Prunus cerasifera 'Atropurpurea' (pissardii) (4)

PISSARD PLUM

Densely branched, upright tree to about 20 ft. Leaves reddish-purple. Single pink flowers a little before mid-spring. Small edible fruit. Many selections, differing slightly in leaf color and flowers, have been made over the years. 11.

Selected forms: 'Thundercloud'. Retains good deep purple foliage through summer. CL, CR, DA, EI, GI, IT, ME, WB, WG, WN, WU, 3, 6, 10, 16, 18, 21.*

'Vesuvius'. Relatively large, very deep purple leaves. Seldom flowers. 26.

Prunus virginiana 'Shubert' (2)

SHUBERT CHOKE-CHERRY

Small tree with leaves first appearing green, then turning purple in late spring. Racemes of small white flowers in midspring. FO, PL, VA, WN, 6, 8, 17, 23.

For other *Prunus*, see pages 32, 40, 55, 68.

Hop-tree, Wafer-ash

Ptelea trifoliata (4)

Rounded small tree or shrub with handsome foliage somewhat resembling poison-ivy. Seeds eaten by birds. 8.

Oak

†Quercus acutissima (6-5B)

SAW-TOOTH OAK

Spreading tree with rounded crown to 45 ft. or more. Excellent foliage somewhat like that of American chestnut. Choice. HR, KE, LO, MU, 8, 11, 14, 16, 18, 22.

†Quercus alba (4)

WHITE OAK

Slow-growing, eventually tall tree with stout spreading branches. Stately in old age. Leaves with rounded sinuses and lobes. Reddish-purple autumn color. Does not thrive in New York City. EI, FI, KE, LO, ME, MU, SA, VA, WB, 8, 11, 16, 17, 18, 22.

†Quercus bicolor (3)

SWAMP WHITE OAK

Similar to the preceding species but with slightly less refined leaves. It is a species recommended for moist soils. 8, 17.

†Quercus coccinea (5-4B)

SCARLET OAK

Fine round-headed tree with shiny green leaves. Superb autumn color. Rather difficult to transplant. EI, GU, HO, HR, KR, MU, PR, WB, WN, 6, 8, 10, 11, 12, 16, 17, 18, 22.

†Quercus imbricaria (5)

SHINGLE OAK

Broadly pyramidal tree to about 50 ft. Narrow, unlobed dark green leaves. Deep red-to-yellow

autumn color. EI, HO, PR, SR, 8, 17, 18, 22.

†**Quercus laurifolia** (7)

LAUREL OAK

This oak is a round-topped southern tree to 60 ft. Lustrous semi-evergreen leaves. WB.

†**Quercus macrocarpa** (3)

BUR OR MOSSY CUP OAK

Broadly rounded tree to 80 ft. or more; stout branching habit and often corky-winged twigs. Shiny dark green leaves similar to those of white oak. EI, MU, PR, VA, 8, 17, 18, 20, 22.

†**Quercus nigra** (6)

WATER OAK

Tree to 60 ft. with conical or rounded head and slender branches. Small bluish-green leaves. 11, 12.

†**Quercus palustris** (4)

PIN OAK

Handsome pyramidal, eventually tall-growing tree with drooping lower branches. Deeply cut green leaves often turn a fine red in autumn, but it should be said that autumn color is variable with most such trees. BU, KE, KL, KR, MC, MI, MU, PR, SR, ST, WB, WN, 3, 6, 8, 10, 11, 12, 16, 17, 22, 26.*

Selected form: 'Sovereign'. All branches ascending. It is not columnar. EI, 22.

†**Quercus phellos** (5)

WILLOW OAK

Southern tree to 50–60 ft. with deep green, willowlike leaves. Autumn color yellow. EI, KE, ME, PR, WB, WX, 8, 11, 12, 16, 18.

†**Quercus prinus** (montana) (4)

CHESTNUT OAK

Tree to 50 or 60 ft. with deeply grooved bark somewhat like that of black locust. Suitable for dry, rocky soil. Shiny chestnutlike leaves become orange in autumn. LO, MU, WX.

†**Quercus robur** (4)

ENGLISH OAK

Tall tree with massive spreading branches. Picturesque at maturity. Refined small leaves. Poor autumn color. GI, KE, PR, 8, 17, 18.

Selected form: Var. *fastigiata*. COLUMNAR ENGLISH OAK, CYPRESS OAK. To 40–50 ft. One of the best columnar trees. CO, DA, EI, HO, ME, WN, 6, 14, 17, 18, 22.

†**Quercus rubra** (borealis) (4-3B)

RED OAK

Pyramidal, eventually tall tree. Relatively fast grower. Dark red autumn color. This and most of the other common oaks tolerate city conditions well. FI, GI, GU, HO, KE, KL, ME, MU, PR, SR, WB, WN, 3, 6, 8, 11, 12, 14, 16, 17, 22, 26.*

†**Quercus shumardii** (5)

SHUMARD OAK

Similar to scarlet oak but with deeply cut leaves. EI, LO, SA, WN, 14.

Willow

Salix alba (2)

WHITE WILLOW

Tall tree with upright branches. Golden yellow twig color is conspicuous in winter. Willows, while often very graceful, are short-lived, and their constant twig fall diminishes their usefulness as lawn specimens. The tree forms are fast-growing and in nature are usually associated with moist soils, although in the garden they may grow well with average soil drainage. None should be planted near sewer or water lines. VA. *Selected forms:* 'Tristis' ('Niobe', 'Vitellina Pendula'). GOLDEN NIOBE WEeping WILLOW. Stems brilliantly golden yellow in winter. Some authorities consider this a hybrid, *S. chrysocoma* (*alba* 'Vitellina' x *babylonica*). FI, GU, JU, KE, KL, ME, SR, SS, WB, WN, 6, 8, 10, 11, 17, 18, 22, 26.*

Salix babylonica (6)

BABYLON WEeping WILLOW

The most intensely pendulous willow, but it lacks the good winter twig color of the preceding species. A classic tree, but often mixed up in the trade, as are other willows. DA, KE, LO, ME, MU, SA, WB, 3, 10, 11, 12, 13, 16, 18, 22.

Salix blanda (*babylonica* x *fragilis*) (4)

WISCONSIN WEeping WILLOW

Tree with graceful pendulous branches, but only half as long as those of *S. elegantissima*. Reddish-brown twig color. BU, KL, MC, 11, 18, 21.

Salix elegantissima (?*babylonica* x *fragilis*) (4-3B)

THURLOW WEeping WILLOW

Perhaps the most gracefully pendulous willow for the northern states. HO, WB, WG, 22.

Salix matsudana 'Tortuosa' (5-4B)

CORKSCREW WILLOW

Upright tree to 30 ft. or more. Branches twisted. Effective in winter, but best to see before purchasing. Twigs useful for winter decorations and flower arrangements. DA, GI, HO, ME, PL, SS, 2, 8, 10, 11, 13, 16, 17, 18, 21, 26.

Named hybrid: 'Golden Curls'. A cross with *Salix alba* having bright yellow twigs. DB, FO, 17.

Salix pentandra (4)

LAUREL WILLOW

Rounded upright tree to about 40 ft. Shiny dark green leaves. AE, VA, 6, 10.

Salix sepulcralis (*salamonii*) (*babylonica* x *alba*) (5-4B)

SALAMON WEeping WILLOW

Ultimately a sizable tree with spreading branches and loosely pendulous branchlets. GI.

For other Salix, see pages 46, 57, 70.

Sassafras

Sassafras albidum (5-4B)

Rather narrow upright tree with green twigs and

lustrous leaves that occasionally have deep sinuses. Orange-scarlet fall color. DU, FO, LO, ME, 8, 22.

Linden, Basswood

†*Tilia americana* (2)

BASSWOOD, AMERICAN LINDEN

Tall tree with oval or spreading crown. The large coarse leaves are insect-prone but, as with other lindens, the fragrant small flowers are attractive to bees. Tolerant of a wide range of growing conditions, but specimens in New York City have shown air pollution injury in recent years. KE, LO, ME, VA, 10, 14, 17, 18, 22.

Selected form: 'Redmond'. EI, FI, HO, IT, MC, PL, 8, 10, 11, 17, 22.

†*Tilia cordata* (3)

LITTLE-LEAF LINDEN

Pyramidal, eventually tall tree with relatively small, heart-shaped leaves. Tolerant of diverse growing conditions and often used as a street tree. Like most lindens, an excellent shade tree. Variable. FI, GI, KE, KR, ME, MU, PA, SR, VA, WB, 6, 8, 10, 14, 18, 22, 26.*

Selected form: 'Greenspire'. With straight single trunk, radially produced branches and spire-like crown. EI, JU, KL, KR, MC, OL, PL, WB, WN, 3, 6, 10, 16, 18, 22, 26.

†*Tilia euchlora* (?cordata x dasystyla) (4)

CRIMEAN LINDEN

Large spreading tree with glossy bright green leaves. 8, 10, 17, 18, 22.

†*Tilia europaea* (vulgaris) (cordata x platyphyllos) (4-3B)

COMMON EUROPEAN LINDEN

Large spreading tree with dark green leaves. Associated with old estates. GI, 18.

Tilia mongolica (4)

MONGOLIAN LINDEN

Refined pyramidal tree to about 30 ft. Small deeply cut leaves very distinct from those of other lindens. VA.

†*Tilia platyphyllos* (3)

BIG-LEAF LINDEN

Large, rounded or pyramidal tree with rather coarse 5-in.-wide leaves. Casts dense shade. 8.

†*Tilia tomentosa* (5-4B)

SILVER LINDEN

Stoutly branched, broadly pyramidal, tall tree with leaves conspicuously white beneath. One of the most handsome lindens, but mainly a park or estate tree. EI, FO, 8, 18, 22.

Elm

Ulmus alata (6)

WAHOO ELM

Small- to medium-sized rounded tree with distinctive corky twigs. LO.

Ulmus carpinifolia (4)

SMOOTH-LEAVED ELM

Tall tree with rounded to pyramidal habit.

Selected form: 'Christine Buisman'. Oval-shaped tree more-or-less resistant to Dutch elm disease. It does not have the vase-shaped habit of the American elm. Now thought to be an off-spring of *U. x hollandica*. CR, WN, 10, 22.

Ulmus glabra 'Camperdownii' (4)

CAMPERDOWN ELM

Pictureque small tree often twice as broad as tall, with asymmetrically weeping branches. A popular old estate tree with excellent winter character, but not immune to Dutch elm disease. KE, OL, WN, 6, 10, 17, 26, 28.

Ulmus parvifolia (5)

CHINESE ELM

Round-topped tree of medium size with 1-2-in.-long leaves that sometimes have good red autumn color, a unique character among elms. Some trees have fine mottled bark. Resistant to Dutch elm disease. One of the best elms for general planting. Not to be confused with *U. pumila*, which is often listed in catalogs as "Chinese elm." FO, KE, WN.

Selected form: Var. sempervirens (pendens). EVERGREEN ELM. Evergreen only in mild climates. Drooping branches. LO, 20, 29.

Ulmus pumila (3)

SIBERIAN ELM

Fast-growing, weak-wooded tree to about 50 ft. Small fine-textured leaves. Used sometimes as a hedge in cold areas. Drought resistant. Often planted in the Midwest. Resistant to Dutch elm disease. FI, GU, IT, KE, KL, MC, ME, VA, WB, WN, 6, 18, 26.

Zelkova

†*Zelkova serrata* (5)

JAPANESE ZELKOVA, GRAY-BARK OR KEAKI ELM

Tall, broadly round-headed tree with ascending branches. This elm relative is mechanically resistant to Dutch elm disease because of its smooth gray bark, which is plated orange-yellow on older specimens. Bonsai candidate. DA, HR, KE, KR, WB, WN, 8, 10, 17, 18, 22, 26.

Selected form: 'Village Green'. Straight-trunked form said to resemble the American elm. CR, WN, 3, 16, 22.

Jujube

Zizyphus jujuba (6)

Spiny small tree, often shrub, with shiny foliage. The datelike fruits, not always produced in the North, are edible. Bonsai candidate. LO.

EVERGREEN TREES

*Those useful as shade trees marked “†”
Those marked “*” available at most nurseries*

BROADLEAF EVERGREENS

Strawberry-tree

Arbutus unedo (7)

Shrubby tree to 15 or 20 ft. Shiny 4-in. long leaves. Brownish-red peeling bark. Fruits strawberrylike, effective in autumn. Requires acid soil. WX, 15.

Selected form: ‘**Compacta**’. Dense shrub. 20.

Loquat

Eriobotrya japonica (7)

Shrubby tree to 15–20 ft. Long leathery leaves, and 6-in. flower panicles in autumn. Fragrant. Edible orange-yellow fruit. May be grown as a curiosity in protected sites as far north as New York City, but it is at home only in mild climates. LO, 20.

Eucalyptus

Eucalyptus niphophylla (7?)

SNOW GUM

Tree to 25 ft. or more with narrow bluish leaves. Peeling bark. Of interest as the hardiest eucalyptus species in Seattle. FO, GR, LO.

Holly

Ilex aquifolium (6)

ENGLISH HOLLY

Dense tree to 35 ft. or more. Often shrubby in the North. Lustrous foliage, usually spiny. Red berries borne on pistillate (“female”) plants but staminate (“male”) plants needed for pollination. While the tree benefits from summer sun, winter shade is advisable in the North. Very variable. English holly and its forms: DA, GI, KE, SR, WN, 1, 3, 10, 18, 19, 20, 26.

Selected form: ‘**Angustifolia**’ (7-6B). Leaves only 1/2 in. wide. Densely pyramidal small tree in the South; a small shrub with dense foliage habit on Long Island. Bonsai candidate. KE, WN.

Ilex latifolia (7)

Handsome evergreen tree to 50 ft. or more, with rounded crown at maturity. Large, leathery,

saw-toothed foliage and clustered red berries. LO.

Ilex opaca (5-4B)

AMERICAN HOLLY

Evergreen tree to 35 ft. or more, sometimes shrubby. Dull green leaves. Red berries. A systemic insecticide, applied usually once or twice in the spring according to directions, easily controls the miner that often disfigures the leaves. BU, GA, GI, KE, KL, LO, ME, SA, WB, WG, WN, 1, 2, 4, 16, 18, 22, 24, 25, 30.

Selected forms: **Pride Hybrids**. A hardier strain. PR.

‘**Xanthocarpa**’. Pistillate form with yellow berries. DA, KE, WN, 1, 4.

Southern Magnolia

Magnolia grandiflora (7)

A striking evergreen tree, eventually to 60 ft. or more. Thick lustrous leaves 5–8 in. long. Fragrant large white flowers in summer. Occasionally grown in protected sites on Long Island, but best development occurs south of Philadelphia. A variable species with many named forms. DA, EA, HO, KE, ME, SA, WB, WX, 12, 16, 30.

Selected forms: ‘**Edith Bogue**’ (6B). Has retained its foliage over winter in New York City in better condition than other forms. LO.

‘**Madison**’. Hardier than most. Repeat flowering. LO.

‘**Samuel Sommer**’. Ascending branches. Large flowers. Rapid growth. LO.

‘**St. Mary**’. Leaves conspicuously brown underneath. Flowers at an early age. GO, LO, 20.

Oak

Quercus ilex (7)

HOLM OAK

Broad tree to 45 ft. or more. Small leaves, unlobed and deep green in color, almost somber in effect. ME, WX.

Quercus suber (7)

CORK OAK

Broad tree to 45 ft. or more. It provides the cork of commerce, but the thick and ridged bark is ornamental when the tree is grown as a land-

scape subject. Its leaves are small for an oak.
FO, ME, WX.

Quercus virginiana (7)

SOUTHERN LIVE OAK

Tree to about 50 ft. with stout spreading branches. Massive at maturity. Refined, narrow and unlobed leaves. LO, SA, WX, 12, 20.

For other oaks, see page 14.

Evergreen Elm

Ulmus parvifolia sempervirens (pendens) (5)

Medium-sized, with drooping branches. Evergreen only in mild areas. See "Trees for Foliage" p. 16.

CONIFERS

Fir

Abies amabilis (5)

CASCADE FIR, PACIFIC SILVER FIR

Tall conical tree with shiny dark green needles. Like most firs, it grows best in regions with cool, humid weather. FO.

Abies balsamea (3)

BALSAM FIR

A popular Christmas tree. The fragrant balsam fir is most successful in cooler parts of the North. HO, KE, ME, MU, WB, 10, 17.

Abies cilicica (5)

CILICIAN FIR

Handsome tree to 60 ft. or more. Shiny deep green, comblike needles, pointed upward and forming a V-shaped depression along the twigs. Although few specimens are in cultivation, they appear well-adapted to the often dry summers of the mid-Atlantic states. KT.

Abies concolor (4)

WHITE FIR

Variable, like most conifers. In the most elegant forms it is a glaucous bullet-shaped tree to 75 ft. or more. Needles 2 in. long, soft. Performs better in East than most western firs. BR, CR, FO, GI, KE, ME, MU, SR, SS, VA, WB, WN, 6, 9, 10, 14, 17, 18, 26, 29.

Abies fraseri (4)

FRASER FIR, SOUTHERN BALSAM FIR

Much like the balsam fir, somewhat better suited to moderate-climate gardens. Unsatisfactory on Long Island. GI, KE, ME, MU, PR, SR, WN, 9, 10, 17, 29.

Abies grandis (6)

GRAND FIR, VANCOUVER FIR

A giant among firs; in fact, one of the tallest-growing trees of North America. Shiny dark green, comblike needles. BR, FO, 26.

Abies homolepis (4)

NIKKO FIR

Attractive tree to 65 ft. or more. Shiny green needles, whitish beneath. More successful in the mid-Atlantic states than most firs. WN.

Abies koreana (5)

KOREAN FIR

A small fir to 50 ft. WN.

Abies lasiocarpa (2)

SUB-ALPINE FIR

Very narrowly pyramidal tree with a wide distribution in the mountains of western North America. Picturesque, but apparently needs cool, evenly moist climate to perform well. FO, VA, 18, 26.

Abies lasiocarpa arizonica (6)

CORK-BARK FIR

Tree to about 45 ft. Bluish-green needles. GR, KT, WN, 28.

Abies magnifica (5)

CALIFORNIA RED FIR

Narrowly pyramidal tree to 90 ft. or more. Remarkably short and stiff horizontal branches arranged in tiers. BR, FO.

Selected form: *Var. shastensis*. MT. SHASTA FIR. A smaller tree. FO.

Abies nordmanniana (4)

NORDMANN FIR

Tall tree from the Caucasus. Needles shiny green above, whitish beneath. Like most firs, most attractive while young. Does better in the heat of the mid-Atlantic states than most. CL, DA, KT.

Abies pinsapo (6)

SPANISH FIR

Handsome tall tree with rigid needles, densely arranged around the branchlets and extending far down the older wood. KE.

Selected form: 'Glauc'. Needles blue. DA, HU, WN, 29.

Abies procera (nobilis) (5)

NOBLE FIR

Tall tree native to the Pacific Northwest. Bluish-green needles. BO, BR, 26.

Selected form: 'Glauc'. Needles blue. DA, WN, 29.

Abies veitchii (3)

VEITCH FIR

Attractive fir from Japan. Shiny dark green needles, strikingly white beneath. WN, 9.

Monkey-puzzle Tree

Araucaria araucana (imbricata) (7)

Oval tree to 50 ft. or more, with twisted ropelike branches. Unique—and for that reason difficult to use in the landscape. GR, LO, WX, 15, 26.

California Incense-cedar

Calocedrus (Libocedrus) decurrens (5)

Tall tree, usually narrowly columnar in cultivation. Aromatic scalelike needles somewhat re-

semble those of arbor-vitae. BO, BR, CL, FO, KT, SI, WG, YE, 18, 26.

Cedar

Cedrus atlantica (6)

ATLAS CEDAR

Tall-growing tree from the Atlas Mountains of Morocco and Algeria. Often short-trunked and spreading with age. Greenish-blue needles are clustered along the branchlets. This and its selected forms (below), especially *glauca*, are choice bonsai candidates. BR, KE, ME.

'*Argentea*'. SILVER ATLAS CEDAR. KE.

'*Aurea*'. GOLDEN ATLAS CEDAR. CL, DA, FX, HR, HU, KE, KT, ME, SP.

'*Fastigiata*'. COLUMNAR ATLAS CEDAR. CL, CO, DA, FX, KE, 14, 28, 29.

Var. *glauca* (6-5B). BLUE ATLAS CEDAR. Variable. CL, CO, FX, GR, HU, KE, OL, SR, WG, WN, 3, 5, 14, 16, 18, 20, 22, 25, 26.

'*Glauc Pendula*'. WEEPING BLUE ATLAS CEDAR. Slow-growing to about 12 ft.; and broader than tall. Stake while young. CL, CO, DA, FX, GR, HU, KE, KT, OL, SR, WN, 5, 10, 14, 18, 20, 26, 28, 29.

Cedrus deodara (7)

DEODAR CEDAR

Tall spreading tree from the Himalayas. Weeping branchlets and 2-in.-long needles. Shapely in youth, superb at maturity.

Selected forms: '*Kashmir*'. Hardy to Zone 6. GR, SR, WN, 14, 19, 22, 29.

'*Shalimar*'. Even hardier. SP.

Cedrus libani (6-5)

CEDAR OF LEBANON

The cedar of the ancients—striking in old age with flat top and horizontal branches. Var. *stenocoma* is hardier than the species, but it is not usually distinguished in the trade. BR, CL, CO, DA, GR, KE, WG, 20, 22, 28, 29.

Selected form: '*Pendula*'. Small tree with intensely pendulous branches. Stake while young. Not to be confused with '*Sargentii*', a weeping dwarf shrub (see p. 72.) CL, FX, OL, SP, 5, 28, 29.

False-cypress

Chamaecyparis lawsoniana (6-5)

LAWSON-CYPRESS

An exceedingly variable species—some 200 forms, mostly dwarf, are known. Native to a relatively small area in northern California and southern Oregon, where it is called Port Orford cedar. More satisfactory in Europe than in many parts of the U.S. Branchlets frond-like. Foliage often bluish-green. Some trees may grow to 100 ft. or more. BO, FO, KE, YE, 18.

Selected forms: '*Allumii*'. Compact columnar tree with steel-blue foliage. Best while young. DB, GR, KE.

'*Triomphe de Boskoop*'. Pyramidal, to 30 ft. or more. Stiff steel-blue foliage. Named for a town in Holland noted for its many nurseries. 10.

Chamaecyparis nootkatensis (4)

NOOTKA-CYPRESS, ALASKA-CEDAR

A striking conifer from the mountains of the northwestern U.S. and Canada. Ultimately tall-growing. Most trees have notably pendulous branches. FO, YE.

Selected forms: '*Glauc*'. Bluish foliage. KT, WN, 6.

'*Pendula*'. Differs little from the species as found in the higher reaches of the Cascade Mountains of Washington. However, nonpendulous forms exist, and this purported cultivar is included for those who wish to be sure of receiving a weeping Nootka-cypress. It is not a dwarf. CU, FX, GR, HU, KE, KT, OL, SP, SR, SS, WA, WN, 3, 5, 6, 14, 26.

Chamaecyparis obtusa (4-3B)

HINOKI-CYPRESS

Slow-growing conifer with dark green scalelike leaves. In time a large tree. Requires acid soil. This and Sawara-cypress have few insect pests. Both, in their multitudinous forms, are used extensively in bonsai. DA, KE, OL, 5.

Selected forms: '*Crippsii*'. Golden foliage. Slow-growing to about 15 ft. DA, DB, FX, KE, KT, ME, OL, PO, WA, WG, WN, 10, 14, 22, 28, 29.

'*Gracilis*'. Dense slow-growing form of Hinoki-cypress. Pendulous branchlets. A small graceful tree. CO, CR, FX, KE, ME, OL, PO, SS, WN, 10, 14, 18, 19, 25, 26, 29.

Chamaecyparis pisifera (3)

SAWARA-CYPRESS

A variable species with many garden forms, some of which are dwarf. Sawara-cypress itself may attain 75 or 100 ft. Somewhat more tolerant of soil conditions than Hinoki-cypress, but most satisfactory growth occurs in moist climates. KE, WN, 8.

Selected forms: '*Boulevard*' ('*Cyanoviridis*'). When well grown in a moist climate, this is a very attractive small tree with striking silvery-blue, feathery foliage. Eventually to 12 ft. or more. AL, BY, GI, GR, HR, KE, KT, OL, PO, SR, WA, WN, 2, 6, 7, 13, 18, 19, 20, 26.*

'*Filifera*'. THREAD-LEAF-CYPRESS. To 60 ft. or more, with delicate whiplike branchlets. Often wider than tall. EI, GR, KE, KT, OL, WN, 5, 6, 8, 10, 19.

'*Filifera Aurea*'. Same as above but with yellow foliage. GR, KT, SP, WN, WO, 2, 3, 6, 7, 10.

'*Plumosa*'. PLUME-CYPRESS. Of good tree size. Delicate frondlike branchlets. DA, WO, 10, 17.

'*Squarrosa*'. MOSS-CYPRESS. Small feathery silver needles. Ultimately a large tree. KE, WO, 10, 17.

Chamaecyparis thyoides (3)

ATLANTIC WHITE-CEDAR

Pyramidal tree of East Coast marshlands. May grow to 75 ft., usually much less in gardens. Spirelike crown. Less attractive than other *Chamaecyparis*, but tolerant of moist soils. KE, SA, WN, WX.

Selected form: 'Glaucu'. KE.

Cryptomeria

Cryptomeria japonica (6)

Tall pyramidal tree, often with short branches. Somewhat open at maturity. Young trees are shapely, old ones picturesque. A variable species, and this variability extends to hardiness. KE, LO, SR, WN, 2, 18, 22.

China-fir

Cunninghamia lanceolata (7)

Striking tree with stout, shiny green needles, 2-in. long, arranged along the branchlets like the teeth of a comb. So distinct from other conifers that it is difficult to use in the landscape. Ultimately a large tree. AL, FO, KE, 12.

Selected form: 'Glaucu'. Blue needles. FX, KE, KT.

Leyland-cypress

Cupressocyparis leylandii (6B)

A fast-growing bigeneric hybrid (*Cupressus macrocarpa* x *Chamaecyparis nootkatensis*) that has in recent years been widely planted in Europe, where several forms are known. Foliage resembles Nootka-cypress, but the tree is densely pyramidal. 90-ft. specimens exist in England. CL, EI, FO, GR, KE, ME, PO, WG, 3, 16, 20, 30.

Selected forms: DB, FX, GR, KT, 15, 19, 20, 26, 29.

Cypress

Cupressus arizonica (7)

ARIZONA CYPRESS

Broadly pyramidal tree with gray or gray-green scalelike leaves. Eventually to 60 ft. or more. The attractive deep cherry-red bark of some examples suggests a closely related species, *C. glabra*. KE, ME, 20.

Selected forms: 'Gareei'. Hardier than the species. KT.

'Blue Pyramid'. 20.

Cupressus bakeri (5)

MODOC CYPRESS

Small tree with dense rounded habit and gray scalelike needles. The hardiest of the true cypresses. FO.

Cupressus macrocarpa (7)

MONTEREY CYPRESS

A picturesque tree associated with the Monterey

Peninsula of California. Satisfactory in warm coastal areas, where it is frequently used as a clipped hedge. Ultimately to 60 ft. or more. FO, YE.

Cupressus sempervirens var. sempervirens ('Stricta') (7)

COLUMNAR ITALIAN CYPRESS

The most narrowly fastigate of the tall evergreens—and a characteristic tree of the Mediterranean coast. Despite its curious nomenclature, it is a cultivar. Usually sold as *C. s.* 'Stricta' in the South and West.

Selected form: 'Glaucu'. ME, 20.

Juniper

Juniperus chinensis (4)

CHINESE JUNIPER

A very variable species, divided by some botanists into several species and hybrids. Some forms are narrow trees growing to 45 ft; others are spreading shrubs only a few feet high. Generally grayish-green to green foliage, scalelike or awl-shaped. Usually sold in its forms.

Selected forms: 'Columnaris' ('Pyramidalis'). Narrow, to 25 ft. or more. Sharp, awl-shaped needles. DA, FX, GI, PO, WN, 10, 16, 22.

'Kaizuka' ('Torulosa'). HOLLYWOOD JUNIPER. Broad shrubby tree to 15 ft. or more. Twisted branching is unique. Less formal than other large Chinese junipers. HO, KE, ME, OL, PO, SR, WN, 3, 10, 14, 18, 19, 25, 26, 30.

'Keteleeri'. Pyramidal, to about 30 ft. Green scalelike needles and 1/2-in. wide blue berries. Often listed under *J. virginiana*. CR, HO, KE, WN, 3, 8, 10, 14, 19, 21.

'Mountbatten'. Narrowly columnar form with gray-green needles that are mostly awl-shaped. Dense, free-fruited. CR, HO, KE, SS, WN, WU, 14.

'Obelisk'. Narrowly pyramidal, probably to 12 ft. or more. FX, WA, WN, 25.

'Robusta Green' (4). Tufted column to 15 ft. or more. Sinuous branching; less rigid than most upright Chinese junipers. Different. KE, WN, 3, 7, 19, 20, 26, 30.

Juniperus recurva coxii (7)

COX JUNIPER

In cultivation, eventually a medium or large-sized tree with delicate weeping branches and rich green foliage. Rather open and spreading in habit. Sometimes cited as *J. coxii*. KT, SP.

Juniperus rigida (5)

NEEDLE JUNIPER

A graceful small, more-or-less pyramidal tree with pendulous branchlets. Not as stiff in appearance as upright Chinese juniper forms. HR, KT, SP.

Juniperus scopulorum (5-4)

WESTERN RED-CEDAR, ROCKY MOUNTAIN JUNIPER

A variable species, some trees growing to 35 ft. or more. Many silvery-blue pyramidal forms, differing slightly in hardness, have been selected in recent years by mid-western nurseries. VA, WU.

Selected forms: 'Blue Heaven'. Pyramidal. Free-fruiting. CR, GI, KE, SR, WN, WU, 3, 6, 14, 21.

'Cologreen'. Light green upright form. 20.

'Gray Gleam'. Staminate form with foliage especially gray in winter. GI, MU, SP, SR, 10, 20, 29.

'Pathfinder'. Pyramidal, silvery light green. GI, KE, SR, WN.

'Welchii'. Silver-gray in youth. KE, MC, PL, 20, 21.

Juniperus virginiana (3-2)

EASTERN RED-CEDAR

Usually a medium-sized pyramidal or columnar tree in cultivation. Much variation occurs, and countless forms have been named over the years. MC, WB, WN, 10, 12, 18.

Selected forms: 'Burkii'. Conical, with blue foliage. Very hardy. CR, HO, KE, PA, SR, 2, 3, 8, 11, 14, 30.

'Canaertii'. Densely pyramidal, with dark green foliage. Unlike many red-cedars, good green color retained in winter. Free-fruiting. DA, HO, WN, 3, 6, 8, 10, 11, 14, 18, 21.

'Glauc'. Narrowly columnar, to about 20 ft. Bright blue. GI, HO, KE, WN, 8, 11, 14.

'Skyrocket'. Thin column to 10-12 ft. Much like a diminutive Italian cypress. Blue-green. BY, DB, FX, GR, KE, OL, PO, SR, WA, WG, WN, WO, 2, 3, 5, 6, 7, 10, 14, 18, 19.

Incense-cedar

Libocedrus decurrens. See **Calocedrus**.

Spruce

Picea abies (excelsa) (2)

NORWAY SPRUCE

Tall tree with drooping branchlets. Attractive while young, but seldom ages gracefully. Somber. Needs much room for proper development. Most nurseries.

Selected forms: 'Inversa'. DROOPING NORWAY SPRUCE. An odd, at times striking, form. Narrow, intensely pendulous. Eventually to about 30 ft. DA, FX, KT, 29.

Var. **pendula**. WEEPING NORWAY SPRUCE. A collective group of weeping forms. Stake this and the preceding while young. CO, DI, FX, GR, HR, HU, ME, OL, WA, 5, 7, 10, 17, 18, 26, 28.

Picea brewerana (5)

BREWER OR SISKIYOU SPRUCE

Distinctive tree with weeping branchlets and gray-green needles. Needs cool moist atmo-

sphere. Slow-growing, with few cultivated specimens over 35 ft. FO, KT, SK.

Picea engelmannii (2)

ENGELMANN SPRUCE

Much like Colorado blue spruce but with soft needles. Confused in the trade with *P. pungens glauca*. FO, KE, KT, ME, 10.

Picea glauca (alba, canadensis) (2)

WHITE SPRUCE

Tall tree, often with light blue-green needles. Handsome in youth. EI, KE, KR, ME, PR, SS, VA, WB, 3, 6, 9, 18.

Selected form: Var. **densata (3)**. Slower-growing, more compact. CR, HO, HR, JU, MC, ME, MU, OL, PL, SR, VA, WB, 8, 9, 17, 18, 26.

Picea omorika (4-3B)

SERBIAN SPRUCE

Narrowly pyramidal tree to about 75 ft. Striking at maturity. Needles dark green with bluish underside. CL, DA, EI, FO, GR, KE, ME, MU, OL, PR, SR, 3, 6, 9, 10, 14, 15, 18, 26.

Picea orientalis (4)

ORIENTAL SPRUCE

Graceful tall spruce from Asia Minor. Very short dark green needles. Refined. CL, DA, FO, 10.

Picea pungens (3-2B)

COLORADO SPRUCE

Tall tree with green or bluish-green needles that are sharp to the touch. More adaptable to dry summers than are most spruces. Best not grown near Douglas-fir because of gall aphid association. BR, BU, DA, KE, MU, PR, WN, 2, 3, 6, 10, 11, 17, 18, 22, 26.

Picea pungens glauca (3)

COLORADO BLUE SPRUCE

A well-known tree, attractive for a few years, but often aging poorly. Many forms have been selected for especially blue needles. Most nurseries.

Selected forms: 'Glauc. Pendula'. WEEPING BLUE SPRUCE. Narrow, with intensely pendulous branches. Stake while young. CO, KE, OL, SR, WN, WO.

'Hoopsii'. One of the bluest of blue spruces. CO, DA, FX, GR, KE, ME, SP, SR, WN, 5, 6, 8, 10, 17, 18, 23, 28, 29.

'Koster'. Silvery. One of the best. CL, DA, GR, KE, KL, SR, VA, 6, 8, 10, 18, 29.

'Moerheimii'. Dense, compact. Steel-blue. CL, KE, ME, SR, 10, 17, 18, 28, 29.

Picea sitchensis (6)

SITKA SPRUCE

A splendid immense spruce of the North Pacific Coast. When the needles are seen in a certain light, they resemble the shimmering beauty of an ice storm. Grows well in very sandy soil but demands a moist atmosphere. Not generally successful in the eastern U.S. BO, FO, ME.

Pine

Pinus armandii (5)

Tree to 45 ft. or more, somewhat like *P. strobus*, but needles slightly longer, more open habit at maturity and distinctly horizontal branching. KT.

Pinus ayacahuite (5)

MEXICAN WHITE PINE

In cultivation a compact small tree with long gray-green needles in fives. For its origins surprisingly hardy. ME, WN.

Pinus banksiana (2)

JACK PINE

A rather coarse but picturesque tree with short needles arranged in pairs. Usually scrubby but occasionally to 50 ft. or more in the wild. Suitable for form-training in cold areas. Grows better on dry, gravelly slopes than most other pines. MC, WN.

Pinus bungeana (4)

LACE-BARK PINE

Slow-growing, eventually to 40–50 ft. Needles arranged in threes. Attractive exfoliating bark as the tree matures. Usually multi-stemmed. CL, DA, FO, FX, OL, SS, WG, WN, 14, 22, 28, 29.

Pinus cembra (3)

SWISS STONE PINE

Slow-growing pyramidal or columnar tree, usually to not more than 30 ft. in gardens. Dark green needles arranged in fives. Habit of the Swiss stone pine is dense. BY, CL, DA, FX, KE, OL, VA, WN, 7, 8, 10, 14, 18, 22, 28, 29.

Pinus contorta (7)

SHORE PINE

Small tree generally with dense head, but assuming many different shapes along the windswept North Pacific Coast. Short, twisted, deep green needles in pairs. BO, BR, HR, SI, 26.

Pinus contorta latifolia (5)

LODGE-POLE PINE

Eventually a tall tree. Short, twisted needles in pairs. The most common pine of the Northern Rocky Mountains. FO, ME, VA, YE, 10, 26.

Pinus densiflora (4)

JAPANESE RED PINE

Tall, asymmetrically spreading tree with orange-brown bark. Paired needles. DA, KE, 10, 14, 19. *Selected forms: 'Oculus-draconis'.* DRAGON'S EYE PINE. Needles part yellow, part green. CL, CO, DI, FX, GI, GR, KE, KT, OL, SP, SR, 17, 25, 28.

'Umbraculifera'. TANYOSHO PINE. Densely shrubby while young, ultimately an umbrella-shaped tree to 10 ft. or more. AL, CL, CO, CU, GI, GR, KE, KT, ME, OL, SR, WN, 7, 8, 17, 18, 25, 26.

Pinus edulis (cembroides edulis) (4)

PINYON OR NUT PINE

Slow-growing shrubby pine of the American

Southwest, with needles generally in pairs. Somewhat coarse, but older specimens often have character. Of interest as one of the pines with edible seeds. FO, KT, ME.

Pinus flexilis (2)

LIMBER PINE

Slow-growing, eventually a tall tree. Rather short needles arranged in fives. Native to much of the American West. GI, KE, ME, SI, VA, 14. *Selected form: 'Glauca'.* CL, FX, KE, KT, OL, SS, WN, 14, 17, 28, 29.

Pinus halepensis (7)

ALEPPO PINE

A coarse two-needle pine with broadly rounded head at maturity. Tolerant of drought, poor soil and seaside conditions in mild climates. 20.

Pinus jeffreyi (5)

JEFFREY PINE

Tall-growing pine from Oregon and California. Rather long bluish-green needles arranged in fives. Closely allied to ponderosa pine. FO, KT, WN, YE.

Pinus koraiensis (3)

KOREAN PINE

Slow-growing, asymmetrically spreading tree with deep green needles grouped in fives. Seldom over 50 ft. in gardens. Old specimens often picturesque. FO, FX, KE, WN, 14, 28.

Pinus lambertiana (5)

SUGAR PINE

The tallest-growing of all pines, with occasional specimens in the Northwest well over 200 ft. Growth slow, often narrow. It is a five-needle pine. FO, WN.

Pinus monophylla (5)

SINGLE-NEEDLE PINYON PINE

Flat-topped shrubby tree, remarkable among pines for its solitary needles. FO, KT, SI, YE, 29.

Pinus monticola (5)

WESTERN WHITE PINE

Much like *P. strobus*, but more narrowly symmetrical. BR, FO, VA, WN.

Pinus nigra var. nigra (P. austriaca) (4)

AUSTRIAN PINE

To 75 ft. or more, with spreading branches and stiff, dark green needles in pairs. Attractive rough deep-cinnamon bark. Subject to Diplodia tip blight in Northeast. BR, GI, JU, KE, MC, ME, MU, OL, PL, SR, WB, WN, 6, 9, 10, 18, 19, 22, 26.*

Pinus palustris (australis) (7)

LONG-LEAF PINE

Tall forest tree of the Deep South. Remarkably long (9–18 in.) needles arranged in threes. Its habit is graceful and distinct. WX, 12.

Pinus parviflora (pentaphylla) (5)

JAPANESE WHITE PINE

Handsome tree with short needles grouped in fives. Generally slow-growing. Densely compact while young. Broadly spreading at maturity. Seldom over 45 ft. in gardens. Variable, but usually beautiful. For bonsai. CL, HR, KE, 14.

Selected form: 'Glauca'. CR, DA, GI, GR, KE, KT, ME, OL, SS, WN, 14, 17, 25, 26, 28, 29.

Other selections, mainly for bonsai: FX, GR, HR, KT, SP, 28, 29.

Pinus peuce (4)

MACEDONIAN PINE

Slow-growing five-needle pine. Dense. A columnar or narrowly pyramidal tree seldom over 30 ft. in gardens. FX, GR, OL, 14.

Pinus pinea (7)

ITALIAN STONE PINE

Tall umbrella-shaped tree, characteristic of the Mediterranean countryside. Cultivated since early times for its edible seeds (called 'pine nuts'), a staple of Middle Eastern cookery. GI, 20.

Pinus ponderosa (5)

PONDEROSA OR WESTERN YELLOW PINE

Tall, open and fast-growing tree, often with long needles, usually grouped in threes. Native to a large part of the American West. Plated reddish-brown bark on old trees is attractive. BR, FO, KT, MC, ME, MU, OL, PL, VA, WN, YE, 9, 17.

Pinus radiata (7)

MONTEREY PINE

A beautiful, irregularly spreading tree at maturity, slightly resembling an old Cedar of Lebanon, but with a rounded head. This pine of the California coast has bright green needles arranged in threes. SI, YE.

Pinus resinosa (2)

RED OR NORWAY PINE

Tall tree similar to Austrian pine, but having flexible needles. Best in the cooler parts of the northern U.S. and adjacent Canada, where it is native. Grows poorly in New York City. ME, MU, WB, WN, 6, 8, 10, 17, 18.

Pinus sabiniana (6)

DIGGER PINE

Medium-sized tree from California with long grayish-green needles in threes. Sparse open picturesque habit at maturity. Named for the Digger Indians. One of the pines with edible seeds. FO, SI, YE.

Pinus strobus (3-2B)

EASTERN WHITE PINE

A beautiful, eventually tall-growing tree of eastern North America. Bluish-green or green needles in fives. Often picturesque at maturity. Highly susceptible to air pollutants, but variability extends even to this. BR, CR, GA, GI, KE, ME, PA, SR, WN, WU, 3, 6, 9, 11, 12, 14, 19, 22.*

Selected forms: 'Fastigiata'. Columnar while young. CO, GI, KE, KT, ME, OL, SR, SS, WN, 10, 14, 17, 18, 25, 26, 28, 29.

'Pendula'. Weeping, never attaining a good tree size. Stake while young. CL, DI, FX, GI, GR, HU, KE, ME, OL, SR, WN, 3, 14, 17, 25, 26, 28, 29.

Pinus sylvestris (2)

SCOTS PINE

A variable two-needle pine growing to about 75 ft. Slightly coarse gray-green needles. Attractive orange bark and sparse habit when fully grown. BR, GI, HR, KE, ME, MI, MU, PL, VA, 6, 9, 10, 12, 14, 15, 16, 18, 19.*

Selected forms: 'Fastigiata'. COLUMNAR SCOTS PINE. CL, CG, FX, GI, GR, KE, KT, SP, VA, WN, 8, 26.

Pinus thunbergiana (5)

JAPANESE BLACK PINE

Medium-sized tree with distinctively asymmetrical habit. Dark green needles in pairs. One of the best conifers for sandy soil and seaside. Bonsai candidate. BR, GI, KE, ME, MU, OL, PA, SR, WN, 3, 9, 10, 12, 14, 16, 18, 19, 20, 22.

Selected forms: Var. *corticos*. Corky bark esteemed by bonsai fanciers. CO, GR, HR, KT, MA.

'Oculus-draconis'. Needles variegated. CO, FX, KT, SP.

Pinus wallichiana (griffithii, excelsa) (6)

HIMALAYAN PINE

Tall tree resembling eastern white pine, but with long drooping needles. Bluish-green. Striking, graceful. CL, DA, FO, FX, GR, ME, 14.

Selected form: 'Zebrina'. Needles variegated. CL, CO, FX, KT, 28, 29.

Oriental Arbor-vitae

Platycladus orientalis (Thuja orientalis) (6)

Tree to 25 ft. or more, often shrubby. Fresh green scale-like foliage in vertical planes. Usually listed under its former names, *Thuja orientalis* or *Biota*. KE, SA, 14.

Douglas-fir

Pseudotsuga menziesii (taxifolia, douglasii) (7-4)

A famous—and variable—timber tree of western North America (often listed as *Abies douglasii*). Northern nurseries usually sell the hardy Rocky Mountain variety *glauca* (sometimes calling it such, more often not), which is not necessarily bluish in appearance. The attractive deep green, fast-growing Pacific Coast variety *viridis* is not reliably hardy in the Northeast. Neither should be grown near Colorado spruce (*Picea pungens*) because of gall aphid association. BR, FO, GI, KE, KR, MC, MU, PL, PR, SR, WB, WE, 3, 6, 9, 10, 14, 17.*

Selected forms: 'Fastigiata'. Conical, with strongly ascending branches. CO, GI, KE, 8, 28, 29.

'Pendula'. Drooping branches. This and the preceding are hardy forms. CL, GI, KE, KT, WN, 17, 28.

Japanese Umbrella-pine

Sciadopitys verticillata (5)

Slow-growing pyramidal tree, attaining perhaps 40 ft. after many years. Remarkable for its united needles, lustrous deep green. Dense while young, usually open at maturity. CL, DA, DI, FO, FX, GR, KE, OL, SP, WG, 8, 10, 18.

Redwood

Sequoia sempervirens (7)

The tallest-growing tree of North America, native only to the mild California coast. Not for every garden, and certainly not for the Northeast, but in mild climates with a constantly humid atmosphere, redwood can be a magnificent tree. CA, FO, HR, ME, SI, YE, 20.

Giant-sequoia, Big-tree

Sequoiadendron giganteum (*Sequoia gigantea*) (6)

The most massive, although not the tallest tree of North America. Native to the Sierra Nevada of eastern California. Hardier than the redwood and occasionally grown even in southern coastal New England. BR, CA, DA, FO, HR, ME, SI, YE, 20.

Arbor-vitae

Thuja occidentalis (3-2)

AMERICAN ARBOR-VITAE

Medium-sized pyramidal tree with scalelike leaves. Stiffly formal. Grows better in moist soil than most other conifers. Tolerates light shade. About 127 forms, including shrubby, globose ones, have been selected over the years. They are slightly less hardy than the species. GI, KE, ME, MU, 8, 9, 14, 17.

Selected forms: 'Fastigiata' ('Pyramidalis'). Useful for tall narrow hedges. BU, DA, EI, GI, HE, HO, JU, KE, KL, WB, WU, 2, 3, 8, 10, 11, 12, 16, 21.*

'Nigra'. Dark green. Unlike most forms, retains good color in winter. CR, GI, KE, ME, OL, PA, SR, SS, WN, 2, 6, 8, 10, 11, 14, 16, 22, 23.

'Techny'. Very hardy, compact, dark green. CR, HO, JU, KE, MU, OL, PA, WB, WN, 2, 8, 10, 11, 17, 21, 23, 29.

'Wareana'. Pyramidal, dense. Bright green. Very hardy. BR, DA, EI, WN, WU, 6, 10.

Thuja orientalis—see *Platycladus orientalis*, pages 23, 77.

Thuja plicata (6-5)

GIANT ARBOR-VITAE

Fast-growing tree with shiny bright green scalelike leaves. Massive at maturity, and often multi-stemmed. BO, BR, DB, FO, WN, 10, 26.

Hiba Arbor-vitae

Thujopsis dolabrata (6)

Small to medium-sized Japanese tree, sometimes shrubby. Similar to arbor-vitae, but with broader, very flattened branchlets and larger, shiny leaves, silvery beneath. KT.

Hemlock

Tsuga canadensis (4-3B)

COMMON HEMLOCK

Graceful shade-tolerant tree to 50 ft. or more. Attractive short needles. May be used for dense clipped hedges. This is not a tree for windy sites. BR, GA, GI, KE, KL, ME, MU, SR, WB, WN, 2, 3, 6, 10, 14, 16, 22.*

Selected forms: 'Atrovirens'. Dark green. FX, KT.

Var. *pendula* (*sargentii*). SARGENT WEEPING HEMLOCK. Eventually to 10 ft. or more, often three times as wide. One of the finest weeping trees. AL, CO, DB, FO, FX, GI, GR, KE, KT, ME, OL, PO, SP, TW, WG, WN, WO, 10, 19, 22, 28.

Tsuga caroliniana (4)

CAROLINA HEMLOCK

Slower-growing in youth than common hemlock, but often more dense at maturity. It will grow eventually to about 50 ft. GA, GR, WN, 9, 10, 18.

Tsuga diversifolia (5)

JAPANESE HEMLOCK

Usually only a small tree in America. Spreading branches. Often multi-stemmed. CL, DA, FX, HR, KE, SP, TW, WN, 10, 19.

Tsuga heterophylla (5)

WESTERN HEMLOCK

The tallest and perhaps most attractive hemlock, but it requires a humid atmosphere. Not for the Northeast. BO, BR, FO.

Tsuga mertensiana (6)

MOUNTAIN HEMLOCK

Distinctive hemlock native to higher elevations from Alaska to California. Slender, pendulous branches and radially spreading needles. Although it may grow to 90 ft. or more in the Northwest, it is only a slow-growing shrub in the Northeast. BO, DB, FO, FX, GO, GR, OL, WN, 19.

Tsuga sieboldii (5)

SIEBOLD HEMLOCK

Similar to *T. diversifolia*. Yellowish-brown glabrous branchlets (reddish-brown hairy branchlets in *T. diversifolia*). DA, 10.



In the foreground, a tree more slow-growing than dwarf, a dwarf Alberta spruce (*Picea glauca* 'Conica'). Behind is a Sargent weeping hemlock (*Tsuga canadensis* var. *pendula*) a choice weeping tree.

FLOWERING TREES

*Those useful as shade trees marked “†”
Those marked “*” available at most nurseries
(See also Deciduous Trees Planted for Foliage)*

Horse-Chestnut, Buckeye

Aesculus carnea (hippocastanum x pavia) (4)

RED HORSE-CHESTNUT

Round-headed tree to 60 ft. or more. Flowers in upright clusters, flesh-colored to deep red. Early May. GI, WN, 20.

Selected form: ‘Briotii’. Flowers bright scarlet. EI, HO, KE, SR, WG, WN, G, 18, 22, 23.

Aesculus glabra (3)

OHIO BUCKEYE

Round-headed tree to about 30 ft. with greenish-yellow flowers in 6-in. upright panicles in early May. Rather coarse foliage turns orange in autumn. DU, KE, KR, VA, WB, WX, 8, 17.

†Aesculus hippocastanum (3)

COMMON HORSE-CHESTNUT

Oval-shaped, eventually spreading tree to 60 ft. or more. Showy upright clusters of white flowers, tinged red, in early May. The leaves, susceptible to an unsightly leaf scorch in dry summers, cast a dense shade. Fruits nostalgic but messy. Mainly an estate or park tree. EI, KE, VA, 6, 8, 17, 18, 22.

Selected form: ‘Baumannii’ (4-3B). DOUBLE-FLOWERED HORSE-CHESTNUT. Similar to the preceding, but with double flowers. Does not set fruit. WG, WN, 8, 17, 22.

†Aesculus octandra (5)

SWEET BUCKEYE

Large spreading tree with conspicuous upright panicles of yellow flowers in midspring. Leaves turn yellow in autumn. DU, GA, 8.

Aesculus parviflora (see p. 35).

Aesculus pavia (5)

RED BUCKEYE

Small tree or shrub to 12 ft., with dainty red flowers in early- or mid-May and, for an *Aesculus* refined foliage. DU, KE, LO, ME, SA, WX, 22.

Silk-tree

Albizia julibrissin (7)

Tree to 25 ft. or more with open, spreading habit. Flowers light pink, resembling powder-puffs. July–August. Refined, doubly compound leaves. Very late to leaf out in spring. Often called

“mimosa.” Some trees offered are likely the hardier variety *rosea*. Both are valued for their relatively long flowering season, but individual trees vary in flower color and length of bloom. EA, FI, HO, HR, ME, WN, 11.

Albizia julibrissin rosea (6-5)

HARDY SILK-TREE

Similar to the preceding, but with deeper pink flowers. Hardier. Often shrubby in cold areas. CL, DA, SR, 18, 20.

Shadbush, Service-berry

Amelanchier canadensis (4)

Several closely related species, including *A. arborea* (to 30–50 ft.) and the equally tall *A. laevis*, are often combined in the trade with *A. canadensis*, a more-or-less columnar shrub or small tree to 25 ft. All are shade tolerant. White flowers in mid-April in New York area are pretty but short-lived. Birds quickly eat the purple berries that ripen in June. Smooth gray bark attractive in winter. EI, FO, HO, KE, OL, PR, SR, SS, WB, WN, 6, 8, 10, 11, 14, 16, 17, 22, 25.*

Amelanchier laevis (3)

ALLEGHENY SERVICE-BERRY

Handsome small tree with spreading branches and smooth gray bark. Young leaves reddish-bronze. Flowers and fruits similar to *A. canadensis*. Of year-round interest. DU, GA, KE, WG, WN, 8, 14.

Chestnut

†Castanea mollissima (5-4B)

CHINESE CHESTNUT

Tree to about 60 ft. with dense, rounded head. Lustrous foliage. The long catkins of creamy-white flowers, while ill-scented, are handsome in late June or July. Resistant to chestnut bark disease. If grown for nuts, two or more trees should be planted. BR, BU, EA, GI, JU, KE, KL, MC, ME, MI, MU, ST, WB, 8, 10, 11, 18, 22, 26.*

Catalpa

†Catalpa speciosa (4-4B)

Tall rapid-growing tree of loosely pyramidal habit. Coarse. Conspicuous panicles of white

flowers, marked yellow, in June. Large heart-shaped leaves. Beanlike pods persist into winter. Mainly a park or estate tree. ME, MU, WN, 6, 10, 11, 21.

Redbud

***Cercis canadensis* (4)**

EASTERN REDBUD

Tree to 25 ft. or more, with loose open habit and rather small heart-shaped leaves. Rosy purple pealike flowers in early May. Better performance in the South and Midwest than North. BU, CL, FI, FO, IT, KE, KL, KR, MC, ME, MU, PR, SR, WB, WG, 6, 8, 11, 12, 16, 17, 22.* *Selected forms:* Var. *alba*. White flowers. WN, 8.

'Forest Pansy'. New leaves maroon, later green. KR, 11.

***Cercis chinensis* (6)**

CHINESE REDBUD

Small tree, usually shrubby, to 10 ft. or more. Rosy purple flowers in early May. More conspicuous in bloom than *C. canadensis*. FO, LO, ME, WG, WN, 3, 22.

Fringe-tree

***Chionanthus retusus* (5)**

CHINESE FRINGE-TREE

Usually an upright-branched tree to about 25 ft. Although the white flowers are smaller than in the next species, they are more profuse. Early June. Choice. SA.

***Chionanthus virginicus* (4)**

FRINGE-TREE, OLD-MAN'S-BEARD

Tree to about 20 ft., often shrubby and broader than tall at maturity. Drooping loose panicles of white flowers in early June. CL, DA, DU, EI, FO, HO, LO, SA, SR, WG, WN, WX, 8, 10, 16, 17, 18, 22.

Yellow-wood

†*Cladrastis lutea* (3)

Rounded tree to 40 ft. or more with smooth gray bark. Fragrant white wisterialike flowers in late May. Ages gracefully. DA, DU, EI, FO, KE, ME, WG, WN, WX, 6, 8, 10, 17, 18, 22.

Clethra

***Clethra barbinervis* (5-4B)**

Small tree, often multi-stemmed, with drooping racemes of fragrant white flowers in July. Outstanding cinnamon bark. Choice. DI, WX.

Dogwood

***Cornus alternifolia* (3)**

PAGODA DOGWOOD

Small tree, often shrubby, with markedly horizontal branching. Clusters of modestly attractive, small white flowers in May followed by blue-black berries in summer. Tolerant of shade. Because birds favor the fruit, most dogwoods are good for wild-life plantings. Nearly all are satisfactory in a naturalistic setting. EI, GR, HO, PL, WG, 8, 17, 18, 21, 23.

***Cornus florida* (5-4 B)**

FLOWERING DOGWOOD

Small tree with horizontal branching. Flower bracts white, showy. Early May. Berries and autumn foliage color red. Common but choice, although not always easy to grow well because of borers and other pests. Acid soil. Shade tolerant. BU, DA, GA, GI, IT, KL, KR, PR, SR, WB, WG, WN, 3, 9, 10, 11, 12, 14, 16, 25.*

Selected forms: 'Cherokee Chief'. Flower bracts ruby red. BU, CL, CR, DA, FI, GR, KR, ME, MI, ST, WG, 3, 11, 26.*

'Cherokee Princess'. Numerous large white flower bracts. CL, FI, GR, KE, ME, SR, 3, 26.

'Cloud 9'. White bracts. Blooms while young. CL, DA, GR, KE, KR, ME, ST, WG, 11, 26.

'Pendula'. Stiffly weeping branches. Bracts white. CL, FX, GR, KE, ME, OL, WN, 14, 26, 28.

'Pluribracteata' ('Plena'). Double white flower bracts. CL, GR, WG, WN, 10, 14, 18, 28.

'Welchii'. Grown only for its foliage, colored green, white and pink. CL, CO, DA, GI, KR, KE, OL, WN, 10, 26, 28.

***Cornus florida rubra* (5)**

PINK FLOWERING DOGWOOD

Flower bracts vary from pink to deep red. BU, CL, FI, GA, GI, IT, KE, KL, KR, OL, SR, WG, 3, 10, 12, 22, 25, 26.*

***Cornus kousa* (5)**

JAPANESE OR KOUSA DOGWOOD

Tree to 20 ft. or more, with spreading dense habit at maturity. White flower bracts are similar to *C. florida*, but pointed. Bracts effective for several weeks in June. Fruits strawberrylike, edible. Autumn foliage red. The mottled brown and white bark is attractive in winter. A superb tree which often performs better in New York City and points north than *C. florida*. BR, CR, DA, DU, EI, HO, KE, OL, PR, SA, WN, 3, 8, 10, 11, 12, 15, 16, 18, 22, 25.

Selected forms: 'Milky Way'. Flowers profuse. 2.

Var. *sinensis*. Bracts slightly longer than in the species. CL, FO, FX, GR, KL, KR, SR, WG, 6, 18, 28.

Other selections: CL, WG, 22.

***Cornus mas* (4-3B)**

CORNELIAN-CHERRY

Small spreading tree or large shrub with clusters of tiny yellow flowers in early spring. Conspicuous red cherrylike fruit in late summer. BO, DA,



Roche

The 3-inch-wide autumn flowers of the *Franklinia alatamaha*.

FO, GO, GR, KE, ME, OL, SR, WG, WN, 6, 7, 8, 10, 17, 18, 22, 23.

Cornus nuttallii (7-6B)

PACIFIC DOGWOOD

A giant by dogwood standards—to 60 ft. or more. Growth habit fairly narrow compared with *C. florida*. Large white flower bracts, 4–6 in a group. April-flowering, but often with occasional flowers in late summer. A handsome tree, but generally not performing well in the East. BO, BR, FO, GR, SI, YE, 26.

Selected hybrid: 'Eddie's White Wonder' (nuttallii x florida). Slightly harder than *C. nuttallii*, but flower buds will blast in a severe New York winter. GR, 15.

Hawthorn

Crataegus arnoldiana (4-3B)

Dense rounded tree to about 2 ft. Thorny, like most in the genus. Moderately showy white flowers in late April. Orange-red fruit conspicuous in late summer before other hawthorn fruit ripens. This and most other hawthorns are good for wild-life plantings. KE, VA.

Crataegus crus-galli (4)

COCKSPUR HAWTHORN

Fiercely armed tree to 25 ft. or more. Dense, often as broad as tall. Shiny leaves. White flowers in mid-May. Bright red fruit persists into winter. Excellent wild-life cover. EI, HO, KE, VA, WB, WN, 8, 10, 14, 17, 18, 22.

Selected form: 'Thornless'. HO, 8, 17, 24.

Crataegus laevigata (oxyacantha) (4)

ENGLISH HAWTHORN

Dense round-headed tree to 15 or 20 ft. with small 3–5-lobed leaves. White flowers in mid-May. Scarlet fruit. No autumn color. This and its forms are probably the most free-flowering of all hawthorns.

Selected forms: 'Autumn Glory'. Single white flowers. Long-lasting, large red berries in autumn. Not as hardy as the species. WN, 8, 10, 18, 26.

'Paulii'. PAUL'S SCARLET HAWTHORN. Flowers double, scarlet. Few fruits. Leaves subject to fungal damage. BU, DA, EI, GI, KL, MC, ME, WB, WG, 6, 10, 18, 21, 26.

'Plena'. Double white flowers. Few fruits. 8.

'Superba' ('Crimson Cloud'). Flowers single, bright red with star-shaped white center. Fruits red. KE, KR, ME, WG, WN, 3, 8, 16, 21, 22, 26.

Crataegus lavalleyi (carrieri) (crus-galli x pubescens) (4)

LAVALLE HAWTHORN

Densely branched tree to 15 or 20 ft. Numerous white flower clusters in mid-May. Scarlet fruit persists into winter. Good autumn foliage color. CR, EI, SR, WN, 3, 8, 10, 18, 22, 26.

Crataegus monogyna 'Stricta' (4-3B)

Fastigate tree to 20 ft. or more. Narrow habit less notable at maturity. White flowers in mid-May. Red fruits. No autumn leaf color. DA, HO, WN, 18, 22.

Crataegus nitida (4-3B)

GLOSSY HAWTHORN

Round-headed tree to about 25 ft. Shiny leaves with orange-red autumn color. Persistent red fruits. 8.

Crataegus phaenopyrum (cordata) (4)

WASHINGTON HAWTHORN

Eventually round-headed tree to 20 ft. or more. Very thorny. White flowers in late May or early June. Scarlet-orange autumn foliage color. Small red fruit persists into winter. This hawthorn is suitable for conservation plantings. CL, DA, FO, KE, ME, OL, SR, WB, WN, 3, 8, 11, 16, 17, 22, 24.*

Crataegus pinnatifida (5)

CHINESE HAWTHORN

Round-headed tree to about 15 ft. Lustrous dark green, deeply lobed leaves. The deep red fruits are exceptionally large for a hawthorn. 17, 18.

Crataegus 'Toba' (succulenta x laevigata 'Paulii') (3)

Tree to about 15 ft. with fragrant, double whitish flowers. Fading pink to deep rose. PL, VA, WG, WN, 6, 8, 10, 18, 22, 26.

Crataegus viridis 'Winter King' (4)

Spreading tree, probably growing to about 25 ft. White flowers in mid-May. Profuse and persistent red fruits, borne at an early age. EI, HO, ME, 8, 17, 18, 23, 24.

Dove-tree

†Davidia involucrata (6-5B)

Broadly pyramidal tree to 40 ft. or more. A dogwood relative, it has two large white flower bracts of uneven size. Early or mid-May. Bracts, while striking at close range, are not long-lasting, nor are they borne at an early age. BO, DA, GO, GR, LO, 2.

Franklinia

Franklinia (Gordonia) alatamaha (5-4B)

Upright tree to about 20 ft., often shrubby in cold areas. White, 3-in. wide, camellialike flowers from September to frost. Autumn foliage orange-red. Good bark character. Frequently short-lived in the North, but worth growing for its year-round interest. CL, EI, FO, FX, GO, HO, KE, LO, WB, WG, WN, WX, 2, 10, 18, 20, 22, 29.

Ash

†Fraxinus ornus (5)

FLOWERING ASH

Round-headed tree to 40 ft. or more. Handsome 3-5-in.-long panicles of fragrant white flowers in early May. Distinctive. CL, FO, WG, WX, 10.

For other Ash species, see page 11.

Silver-bell

Halesia carolina (tetraptera) (monticola) (4)

CAROLINA SILVER-BELL

Vigorous tree to 30 ft. or more with spreading branches. While not showy from a distance, the white bell-like flowers have a certain charm that is lacking in many of the common flowering trees. Early May. Few pests. BO, CL, DA, DU, FO, GA, KE, LO, SR, WG, WX, 8, 10, 18.

Castor-aralia

Kalopanax pictus (4)

Eventually a tall tree with stout spreading branches. Large ivylike leaves. Tropical appearance. Large showy umbels of white flowers in mid-summer. Unique and stark in winter outline. FO.

Golden-rain Tree

Koelreuteria paniculata (5)

Upright tree to about 30 ft. with sinuous branching that has considerable winter interest. Refined compound leaves. Conspicuous upright clusters of yellow flowers, July or later, followed by persistent lantern-like pods. Unusually tolerant of urban conditions. Best planted in spring. BU, DA, EA, FI, HO, KE, KL, LO, MC, ME, WB, WG, WN, 10, 14, 16, 18, 20.

Golden-chain Tree

Laburnum watereri (anagyroides x alpinum) (5)

Upright tree to 20 ft. or more. Flowers yellow, in wisterialike clusters, mid-May. Handsome in bloom but of little interest the rest of the year. An application of lime on highly acid soils may be beneficial, but the tree is not notably long-lived in the eastern U.S. Most plants are probably of one cultivar, 'Vossii'. BU, CL, CR, DA, EI, KE, KL, KR, SR, WB, WG, WN, 6, 10, 18, 26.

Tulip-tree

†Liriodendron tulipifera (4)

One of the tallest-growing trees of the eastern American woodland, occasionally to 150 ft. In forests its trunk is straight as a telephone pole, while in gardens where the tree has ample room to develop, it has a fairly broad crown and is stoutly branched. Often called tulip-poplar, but its greenish-yellow flowers, inconspicuous from a distance, are closely related to magnolia. The cup-shaped flowers, with an orange band at the base, are exquisite. DA, EI, FI, FO, KE, KR, MC, MU, WB, WG, WN, 6, 10, 16, 17, 18, 20.*

Maackia

Maackia amurensis (4)

Upright tree to 30 ft. or more, with smooth, yellow-brown bark. Small white pealike flowers in panicles 4-8-in. long. July or August. WN.

Magnolia

†*Magnolia acuminata* (4)

CUCUMBER MAGNOLIA

Tall-growing tree, ultimately developing a massive trunk and branching system. While the yellowish-green flowers in early June are not conspicuous, the red seeds that follow are attractive. EI, GA, KE, LO, PR, WX.

Magnolia acuminata subcordata (*M. cordata*) (5)

YELLOW CUCUMBER MAGNOLIA

Upright tree to 25 ft. or more. Yellow cup-shaped flowers in mid-May, more conspicuous than *M. acuminata*. Bright red seeds protrude from cucumberlike pods in autumn. LO, WX.

Magnolia campbellii (8)

Eventually a very tall, open-growing, sparsely branched tree. The fragrant pink cup-shaped flowers are among the most beautiful in the genus. Early spring. LO.

Magnolia 'Elizabeth' (*heptapeta x acuminata*) (5)

Upright tree of medium size with light yellow flowers before the leaves, reminding one of saucer magnolia. Originated at Brooklyn Botanic Garden. GO, LO.

Magnolia fraseri (5)

Tree to about 40 ft. with spreading branches. Fragrant creamy-white flowers in mid-May. LO.

Magnolia heptapeta (*denudata*) (*conspicua*) (5)

YULAN MAGNOLIA

Tree to 35–40 ft. with spreading branches and smooth gray bark. The fragrant cream-colored flowers, up to 6-in. across, are outstanding in mid- or late April. One of the most attractive of the hardy magnolias. DA, GO, GR, LO, 15.

Magnolia kobus (4)

KOBUS MAGNOLIA

Upright tree to 40–45 ft. Creamy-white flowers 4–5-in. across. April. LO, 18.

Selected forms: 'Leonard Messell'. CL, GO, LO.

'Merrill' (4). Vigorous upright pyramidal tree with small leaves. White flowers similar to those of star magnolia (see p. 00) but slightly larger. Ultimately to 40–50 ft. CL, EI, GO, LO, WG, WN, 2, 6, 10, 17, 18, 20, 26.

Selected hybrid: 'Wada's Memory' (5?). Conspicuous large white flowers in mid-April. Blooms while young. GR, LO.

Magnolia macrophylla (5)

BIG-LEAF MAGNOLIA

Medium-sized southern tree with coarse leaves sometimes 30-in. long. The 1-ft.-wide, fragrant, creamy-white flowers are outstanding when not marred by rain. Very distinctive but difficult to use in the landscape scheme for that reason. DA, GO, LO, WX.

Magnolia salicifolia (5)

ANISE MAGNOLIA

Pyramidal tree to 25–30 ft. Narrow leaves. Fragrant white flowers 5-in. wide. Mid-April. Blooms while young. LO.

Magnolia sieboldii (*parviflora*) (6-5B)

OYAMA MAGNOLIA

Rounded tree to 20–25 ft., or a broad shrub, with leaves bluish beneath. Fragrant white flowers with scarlet stamens. Late May. GO, LO, WT, 15.

Magnolia soulangiana (*heptapeta x quinquepeta*) (4-3B)

SAUCER MAGNOLIA

Spreading tree to about 20 ft., often multi-stemmed. Smooth grayish-white bark. Large, cup-shaped, white-to-purple flowers. The most common magnolia of northern gardens, and one of the prettiest in flower. Like most magnolias, it is tolerant of urban conditions. All are most safely planted in spring. BR, BU, EI, GI, IT, KL, KR, LA, MI, OL, SR, WG, 3, 6, 8, 12, 14, 15, 16, 17, 22.*

Selected forms: 'Alexandrina'. Large rose-purple flowers, white inside. LO, WN, 8, 10, 20, 26.

'Lennei'. Dark purplish-rose flowers with occasional repeat blooms in summer. LO, WN, 8, 10, 15, 17, 26.

'Liliputian'. Rose-white flowers. Slow-growing and of smaller eventual height. GO, LO.

'Rustica Rubra'. Flowers rose-red. KE, LO, 15, 26.

Magnolia sprengeri 'Diva' (6B)

Attractive tree to 40–50 ft. with large, bright pink flowers in early spring before the leaves appear. Slow to bloom. GO, LO.

Magnolia tripetala (4)

UMBRELLA MAGNOLIA

Small, open-headed, southern tree with 12–15-in.-long leaves and large white flowers. Fragrant. Late May. LO, ME, PR, WX, 17, 18.

Magnolia virginiana (*glaucia*) (5)

SWEET BAY MAGNOLIA

Tree to 40 ft. or more in the South, shrublike in the North. Fragrant white flowers over a long period in early summer. Attractive red seeds. Satisfactory in wet or well-drained soil. EI, GI, GO, GR, LO, PR, SA, WG, WN, WX, 4, 8, 10, 16, 17, 18, 22.

Magnolia wilsonii (6)

Small open tree, often shrubby. Fragrant white flowers with conspicuous crimson stamens. May. GO, LO.

For other Magnolias, see pages 17, 39.

Crab-apple

Malus arnoldiana (*floribunda x baccata*) (4-3B)

ARNOLD CRAB-APPLE

Broad dense tree to 18–20 ft. Flowers pink, fading white. Late April. Small yellow-to-red fruits. EI, KE, 8, 10, 18, 22.



The cream and green, orange-based flowers of *Liriodendron*.

Malus atrosanguinea (halliana x sieboldii) (4)

CARMINE CRAB-APPLE

Rather shrubby in youth, eventually a broad-spreading tree to 15 ft. or more. Excellent character at maturity. Lustrous green foliage. Flowers crimson in bud, opening to pink. Early May. Small dark red fruits. Annual bearer. CR, DA, EI, HO, KE, SR, WB, WN, 8, 10, 18, 22, 24, 26.

†Malus baccata (2)

SIBERIAN CRAB-APPLE.

Upright tree to 40–45 ft. with fragrant white flowers in late April. Small yellow or red fruits, usually borne annually. Variable. DU, KE, WN, 8, 10, 14, 22, 24.

Selected forms: 'Columnaris'. WN.

Var. *mandshurica*. Larger flowers a week earlier. One of the first crab-apples to bloom in spring. WN.

Malus coronaria 'Charlottae' (4)

CHARLOTTE CRAB-APPLE

Rounded tree to 15–20 ft. Attractive, large, semi-double, light pink flowers in mid- or late May after most other crab-apples have finished blooming. The large green fruit, while not abundant, may be a nuisance on lawns. Large-fruited crab-apples should not be used as street trees. Charlotte crab-apple, as a derivative of a native crab-apple, should not be grown near red-cedar (*Juniperus virginiana*) because of cedar-apple rust. Oriental species are resistant. WB.

Malus floribunda (4-3B)

JAPANESE FLOWERING CRAB-APPLE

Wide-spreading tree to about 30 ft. Considerable character with age. Flower buds red, opening pink, turning white. Late April. Profuse

small red or yellow fruit borne annually. Most of the single-flowering crab-apples, especially ones that have an abundance of fruit annually, are good wild-life trees. EI, HO, KE, KR, ME, OL, SR, SS, WB, WN, 8, 10, 12, 16, 18, 21, 22, 24, 26.

Malus hupehensis (4)

TEA CRAB-APPLE

Vase-shaped tree to 20–25 ft. Secondary branches are often just long shoots, verging between the interestingly asymmetrical and gawky. Flower buds deep pink, flowers fading to white and fragrant. Late April. Fruits small, greenish-yellow or red. WN, 8, 10, 18, 22.

Malus ionensis 'Plena' (3-2B)

BECHTEL CRAB-APPLE

Round-headed tree to 20 ft. or more. Fragrant pink double flowers in mid-May. Few fruits. Avoid growing near red-cedar because of cedar-apple rust. DA, KE, KL, ME, WN, 8, 10, 21.

Malus purpurea 'Eleyi' (pumila niedzwetzkyana x atrosanguinea) (4-3B)

ELEY CRAB-APPLE

Dense tree to 20 ft. or more. Leaves purplish. Profuse, deep pink single flowers in late April. Fruits sparse. Susceptible to apple scab. HO, KE, SR, 6, 10, 11, 12, 18, 22, 26.

Malus sargentii

SARGENT CRAB-APPLE (see page 40.)

Malus zumi 'Calocarpa' (baccata mandshurica x sieboldii) (5)

ZUMI CRAB-APPLE

Densely branched pyramidal tree to 20–25 ft. Flower buds pink, opening white in late April. Fragrant. Profuse small red fruits held into win-

ter. Alternate bearer. CL, JU, KE, KR, ME, OL, PL, SS, WN, 8, 10, 17, 18, 21, 23, 26.

Other Crab-apples of Hybrid Origin:

Malus 'Almey' (4)

Vigorous tree to 15–20 ft. Flowers rosy-red with white center. This and the following crab-apples usually flower in early May. Bronze foliage. This crab-apple has red fruit in autumn. EI, KE, MI, WB, 6, 8, 10, 18, 21, 26.

Malus 'American Beauty' (4)

Small tree with large double red flowers. Foliage reddish in spring, bronze-green in summer. BU, CR, ME, SR, WN, 16, 21, 22, 26.

Malus 'Dorothea' (4)

Rounded tree to 20–25 ft. Deep pink semi-double flowers. Bright yellow fruits retained into winter. CR, EI, WB, WN, 8, 10, 17, 18, 21, 24.

Malus 'Flame' (2)

Rounded tree to 20–25 ft. Flower buds pink, flowers fading white. Abundant red fruit. Annual bearer. 11, 21.

Malus 'Hopa' (4-3B)

Tree to 20–25 ft. Greenish-bronze foliage. Flowers bright pink, freely produced. Deep red fruit, 2 inches wide, useful for jelly, but a possible nuisance on lawns. Alternate bearer. Susceptible to apple scab. BU, FI, GI, KE, KL, PA, SR, ST, WB, WN, 3, 8, 10, 11, 12, 16, 17, 21, 22, 26.*

Malus 'Katherine' (4)

Tree to 15–20 ft. Flower buds pink, flowers turning white. Profuse large double flowers. Small yellow-red fruit. Annual bearer. CL, CR, EI, KE, WB, WG, 8, 10, 16, 17, 18, 22, 24, 26.

Malus 'Liset' (4)

Tree to 20–25 ft. Reddish-bronze leaves. Profuse purplish-red flowers. Fruits dark red. 8, 17, 21.

Malus 'Pink Perfection' (4)

Small tree with profuse double pink flowers. BU, EI, WN, 3, 16, 21, 22, 26.

Malus 'Radiant' (4)

Upright tree to about 25 ft. Flower buds deep red, flowers deep pink. Small bright red fruit. Annual bearer. Resistant to major crab-apple pests. BU, CL, GI, KL, KR, MC, PL, SR, ST, WB, WN, 3, 8, 10, 11, 18, 21, 22, 24.*

Malus 'Red Jade' (4-3B)

Tree to about 15 ft. Branches spreading, weeping. Candidate for training to special forms. Needs specimen location. Suitable for tub plantings. Flowers single, pink in bud, opening white. Very profuse small red fruit. Annual bearer, although there is slightly better fruit production in some years than others. Originated at Brooklyn Botanic Garden. DA, FX, KE, KR, PA, SR, WG, WN, 3, 6, 8, 17, 22, 23, 26.

Malus 'Royalty' (4)

Both flowers and fruits are dark red. Leaves shiny purplish-red. CL, CR, KR, MC, OL, PL, SR, ST, WB, WN, 3, 6, 17, 18, 21, 23, 26.

Malus 'Snowcloud' (4)

Small tree with 2-in.-wide double white flowers, pink in bud. Very few fruits. BU, DA, EI, ME, WN, 3, 8, 16, 21, 22.

Malus 'Snowdrift' (4)

Oval-shaped tree of modest size. White flowers succeeded by numerous small orange-red fruits in autumn. CR, EI, HO, KR, PL, WB, WN, 3, 8, 17, 23, 26.

Malus 'Vanguard' (4)

Small upright tree of dense habit. Large rose-pink flowers, single. Red fruit, ¾ in. wide; persistent. Annual bearer. Resistant to most crab-apple pests. FI, VA, 18, 21.

China-berry

†Melia azedarach (7)

Round-headed tree to about 40 ft. Long clusters of fragrant purplish flowers in April–May. Small yellow berries persist into winter. Useful for wild-life plantings in mild climates. FO.

Sourwood, Sorrel-tree

Oxydendrum arboreum (4)

Tree to about 35 ft. in the North, taller in the South. Somewhat narrow habit. Conspicuous drooping panicles of white flowers in July. Attractive seed pods contrast well with the brilliant autumn foliage. Acid soil. One of the most ornamental trees of the South, but hardy well into New England. CR, FO, GA, GI, GO, KE, KR, ME, WB, WG, WN, 2, 4, 8, 11, 12, 16, 17, 18, 22.

Cherry, Peach

Prunus 'Accolade' (sargentii x subhirtella) (5)

Small tree with semi-double pink flowers in drooping clusters. Early spring. SR, 15, 26.

Prunus 'Hally Jolivet' (5)

Very shrubby small tree, perhaps attaining 15 ft. at maturity. Diminutive leaves. Refined double-white flowers, pink in bud, in late April. Rather long bloom period. DA, WN, WU, 25.

Prunus maackii (2)

AMUR CHOKECHERRY

Rounded tree to 30 ft. or more. Handsome yellowish-brown, flaky bark; 2-3-in.-long racemes of white flowers in early May. FO, VA, WG.

Prunus padus commutata (3)

MAY-DAY CHERRY

Small tree with rather open habit and drooping racemes of fragrant white flowers in mid- or late April. Early to leaf out. VA, 21.

Prunus pensylvanica (2)

PIN CHERRY

Short-lived but prolific small tree with attractive red bark. Racemes of small white flowers in late April. Useful for wild-life plantings in semi-naturalized land. 8.

Prunus persica 'Alboplena' (4)

DOUBLE WHITE-FLOWERED PEACH

Dense rounded tree to 15 ft. or more. Hand-some flowers in mid-April. Fruit is usually produced on the double-flowered peaches, but it is inferior to that of named fruiting forms. Beware of borers. EA, GI, KE, WB, 11.

Other forms: 'Roseoplena'. Double pink flowers. EA, GI, WB, 11.

'Rubroplena'. Double red flowers. EA, GI, ME, WB, 11.

†Prunus sargentii (4-3B)

Upright tree to 50 ft. or more with rounded top. Flowers deep pink, single. Mid-April. Good autumn color. EI, WN, 8, 10, 14, 22, 26.

Selected form: 'Columnaris'. 8.

†Prunus serotina (3)

WILD BLACK CHERRY

A common tree in old fence rows over eastern part of North America. Useful in wild-life plantings. Drooping racemes of white flowers in mid-May. FO, LO, ME, MU, VA, 8.

Prunus serrula (5)

RED-BARK CHERRY

Spreading tree, sometimes multi-stemmed, to about 25 ft. Superb glossy red bark. White flowers, single, in late April. Worth seeking out. 15, 22.

Prunus serrulata (5-4B)

JAPANESE FLOWERING CHERRY

Handsome tree usually growing to 20–25 ft. Of year-round interest because of growth habit, bark and flowers. Flowers, single or double, vary from white to yellow, pink and deep rose. Late April or early May. As with other *Prunus*, attention must occasionally be given to curb scale insects. The tree is best purchased in its named forms.

Selected forms: 'Amanogawa'. Columnar. Flowers light pink, semi-double, fragrant. WN, 10, 18, 22, 26.

'Kwanzan'. Vase-shaped in youth, rounded at maturity. Large, deep pink flowers, double. One of the hardiest and most satisfactory forms. BU, FI, GI, KE, KL, KR, MC, ME, MI, WB, WN, 3, 6, 11, 12, 16, 18, 22, 26.*

'Shirofugen'. Flower buds pink, opening white. Double. 10, 22, 26.

'Shirotae' ('Mt. Fuji'). Flowers, semi-double or double, white. Especially pretty. DA, GR, ME, WG, WN, 8, 10, 18, 22, 26.

'Shogetsu'. Flowers double, light pink changing to white. WG, 18, 26.

'Ukon'. Flowers double, palest yellow. WN.

Prunus subhirtella (5-4B)

HIGAN CHERRY

Upright or rounded tree to 30 ft. or more. Abundant small light pink flowers in mid-April. Single. 10, 18.

Selected forms: Var. *autumnalis*. Semi-double flowers, some appearing in fall, others in spring. Modest display. EI, GR, WG, WN, 10, 22, 26. Var. *pendula*. Weeping. Flowers single. BU, GU, KE, OL, SR, SS, WB, WG, WN, 3, 8, 10, 11, 14, 15, 16, 18, 22, 26.

Prunus yedoensis (probably serrulata x subhirtella) (5-4B)

YOSHINO CHERRY

Tree to 35 ft. or more. White-to-pink flowers in mid-April. The single flowered cherry of the Tidal Basin planting in Washington, D.C. DA, EI, KE, WB, 3, 8, 10, 16, 18, 22, 26.

Selected form: 'Akebono'. DAYBREAK CHERRY. Flowers soft pink. 18, 26.

Other Prunus, see pages 14, 40, 55, 68.

Pear

†Pyrus calleryana 'Bradford' (4)

BRADFORD PEAR

Broadly pyramidal tree to 45 ft. or more. Attractive white flowers in late April. Lustrous leathery foliage, often with good red autumn color. Fruits, when produced, small, inconspicuous. Resistant to fire blight. BU, FI, IT, KE, KL, KR, MC, OL, ST, WN, 3, 6, 10, 14, 16, 17, 20, 22.*

Selected form: 'Fauriei'. To 25 ft., WG.

Other cultivars: EI, HO, SR, WN, 15, 16, 17, 20, 22.

Locust, Black Locust

Robinia 'Monument' (cultivar or hybrid of *R. hispida*) (4) Tree to 12–15 ft. Deep rose-pink pealike flowers in late May. WG.

Robinia pseudoacacia (3)

BLACK LOCUST

Tall, often sparsely branched tree with delicate light green compound leaves. The deeply ridged bark on older specimens has much character. Fragrant white pealike flowers in late May. Highly esteemed in Europe, but plagued by borers and leafminer in eastern parts of the U.S. Rather weedy, but a tree that has merit where pests are not bothersome. FO, LO, ME, MU, 8.

Scholar-tree, Pagoda-tree

†Sophora japonica (4)

Tall tree with refined compound leaves. White pealike flowers in mid-summer. In growth habit it more closely resembles the American elm than any other tree at BBG. Avoid planting near paths because of its slippery seed pods. CL, DU, KE, OL, WB, WN, 10, 17, 18, 22.



Rockie

The May flowers of Japanese snowbell (*Styrax japonica*).

Selected forms: 'Pendula'. Picturesque weeping tree to 5–15 ft., depending on height of graft. A tight dome. Few flowers. KE, OL, WN, 7, 18. *'Regent'.* Flowers earlier in life than the species. KE, SR, WG, WN, 3, 16, 22.

Mountain-ash

†*Sorbus alnifolia* (5-4B)

KOREAN MOUNTAIN-ASH

Spreading medium-sized tree with smooth gray bark. Simple, somewhat alderlike leaves. Orange-scarlet fruit in autumn. Good fall color. Borer-resistant. All of the mountain-ash trees cited here have moderately conspicuous, flat white flower clusters in mid-May. The fruits of most species will attract birds. DU, FO, WG, 22.

Sorbus americana (2)

Small, often shrubby tree with showy orange-to-red berries in autumn. Leaves compound. More selection work has been done with *S. aucuparia*, the most widely planted species. DU, GA.

Sorbus aucuparia (3)

EUROPEAN MOUNTAIN-ASH, ROWAN-TREE

Tree to 35–40 ft. with oval or rounded crown while young. Conspicuous white flower clusters in spring, showy orange-to-red berries in autumn. Very ornamental, but borer-prone in the East. Often short-lived. The refined compound leaves, unlike those of most European trees, have good red autumn color. BU, DU, FI, GI, IT, JU, KE, KL, KR, SR, ST, 6, 9, 10, 11, 17, 18, 21.*

Selected form: 'Pendula'. Vigorous spreading small tree with pendulous branches. GI.

Other forms: BU, DA, KR, 6, 17.

Sorbus decora (2)

SHOWY MOUNTAIN-ASH

Small northern tree closely related to *S. americana*, but having larger fruit. DU, VA.

Sorbus tianshanica (5)

TURKISTAN MOUNTAIN-ASH

Shrubby tree to about 15 ft. Conspicuous white

flowers and red fruit. Leaves compound. DU, WG.

Stewartia

Stewartia koreana (5)

Pyramidal tree to 35–40 ft. This and the following species are often shrubby in youth. Hand-some 3-in.-wide white flowers with yellow stamens. Late June. Beautiful flaking brown-to-cream bark. Orange-red autumn color. Worth seeking out. Recently considered a cultivar of *S. pseudocamellia* and given the name *'Korean Splendor'*. EI, 22.

Stewartia pseudocamellia (5)

JAPANESE STEWARTIA

Pyramidal tree to 45 ft. Attractive white cup-shaped flowers in late June. Purplish autumn color. Distinctive cinnamon-colored peeling bark. BO, GO, GR, HO, PR, WG, 10, 18.

Snowbell

Styrax japonica (5)

JAPANESE SNOWBELL

Spreading small tree or tall shrub. Refined foliage. Pendulous white bell-shaped flowers in late May. Dainty. Excellent bark and trunk character. BO, CL, EI, FO, GO, GR, HR, KE, LO, WG, WN, 3, 10, 15, 16, 18, 22.

Styrax obassia (5-4B)

FRAGRANT SNOWBELL

Tree to 20 ft. or more. Fragrant white flowers in late May, partly obscured by the large leaves. Smooth gray, sinewy bark. CL, FO, GO, LO.

Lilac

Syringa reticulata (amurensis japonica) (3)

JAPANESE TREE LILAC

Tree to 25–30 ft. Handsome cherrylike bark in youth. Loose upright panicles of white flowers in early June. Not fragrant. EI, FO, HO, JU, PR, SR, VA, WN, 6, 8, 17, 18, 22.

Other Lilacs, see page 47.

FLOWERING SHRUBS

Broadleaf-evergreen and Deciduous

Those marked “” available at most nurseries*

Note: The shrubs in this section are deciduous unless otherwise described.

Bottle-brush Buckeye

***Aesculus parviflora* (4)**

Suckering shrub to 6–8 ft., two or three times as broad as tall. Conspicuous pyramidal clusters of white flowers in early summer when few other shrubs are in bloom. Shade-tolerant, but best flower development occurs in full sun. HO, WG, WV, WX, 8, 17, 22.

For other Aesculus see page 26.

Butterfly-bush

***Buddleia alternifolia* (5-4B)**

FOUNTAIN BUTTERFLY-BUSH

Spreading shrub to 8–10 ft. Long spikes of purplish-lilac flowers in early June. Conspicuous in bloom, but requires periodic pruning to alter a poor growth habit. Prune after flowering. CL, LA, LO, WG.

Named form: ‘Argentea’. Gray-green foliage. WO.

***Buddleia davidii* (5-4B)**

ORANGE-EYE BUTTERFLY-BUSH

Coarse lanky shrub to 8 ft. or more. Valued only for its prolific foot-long flower spikes, ranging in color from white to red and purple, produced in summer when few other shrubs are in bloom. In the North it is best cut back nearly to the ground in late winter. Wood more-or-less hardy on Long Island. BU, CL, DA, EI, FI, GU, IT, KL, KR, LA, WB, WG, WN, 6, 20, 21.*

Selected hybrid: ‘Sungold’ (6). DB, KR, LA, WG, WN.

Carolina Allspice, Sweet-shrub

***Calycanthus floridus* (5-4B)**

Dense mound to 5 ft. or more. Highly scented, dark reddish-brown flowers in early May. Much of the material in the trade may be a related species or hybrid having little scent, except in the foliage. Best to purchase locally at time of flowering so that flower fragrance may be verified.

Camellia

***Camellia japonica* and forms (7)**

COMMON CAMELLIA

Handsome evergreen shrub to 25 ft. or more, much lower toward its northern limit of hardiness. Beautiful white, pink, rose, or red flowers, single or double. Winter to spring flowering. An important mild-climate shrub, but hardiness varies, and plants can be grown in protected sites as far north as Long Island. Little difference in hardiness between this and the following species has been observed at the Brooklyn Botanic Garden. Many, many named forms. DA, EA, KE, ME, NU, 12, 15, 16, 20, 26, 30.

***Camellia sasanqua* and forms (7)**

SASANQUA CAMELLIA

Similar to the preceding, but with smaller evergreen leaves. Autumn-flowering. KE, ME, NU, 12, 13, 15, 16, 20, 26, 30.

***Camellia williamsii* ‘Donation’ (*japonica* x *saluenensis*) (7)**

Graceful evergreen shrub with orchid pink semi-double flowers. GO, NU.

Ceanothus

***Ceanothus* species and hybrids**

A substantial group of evergreen or deciduous shrubs of varied height, mostly native to the West Coast and not often thriving in the East, especially northwards. Leaves frequently small, lustrous and refined. White, blue or purple flower clusters superficially resemble syringa, hence a common name for some kinds—California-lilac. FO, YE, 19, 20.

Button-bush

***Cephalanthus occidentalis* (4)**

Eventually a tall shrub with coarse foliage. Creamy-white ball-shaped clusters of flowers in mid-summer. Suited mainly for wet sites. DU, FO, SA, 8.

Flowering Quince

***Chaenomeles speciosa* (*lagenaria*) and related hybrids (4)**

Shrubs 3–6 ft. with showy flowers ranging in color from red to pink and white (and orange in



Broom (*Cytisus*) can become a nearly-overwhelming mass of flowers.

hybrid form). Flowers over a fairly long period in late April and early May. There are many named forms, and it is perhaps best to choose flower color at a local nursery or garden center. Available from most mail-order firms. Wider selection than most. BR, BU, CL, GR, HR, KE, LO, ME, WG, WN, WU, 8, 15, 20, 23.

Wintersweet

***Chimonanthus (Meratia) praecox* (7)**

WINTERSWEET

Shrub to 6–8 ft. with intensely fragrant yellowish flowers in late winter. Of borderline hardiness in New York City. FO, GO, WX.

Harlequin Glory-bower

***Clerodendrum trichotomum* (6)**

Vigorous coarse-leaved shrub to about 6 ft. in the North, attaining small-tree dimensions in the South. Valued for its fragrant white flowers in August and subsequent blue berries. The berry is attractive in the foreground of a persistent red calyx. WX, 15.

Sweet Pepper-bush

***Clethra alnifolia* (4-3B)**

Lanky shrub to 8 ft., upright spikes of strongly

fragrant white flowers in summer. Decorative seed pods. Good for somewhat moist soils. Shade-tolerant. CL, CR, FO, GA, KE, OL, PA, SR, WG, WN, 6, 7, 8, 10, 15, 18, 22, 23. *Named forms:* 'Pinkspire'. Deep pink. WG, 6. 'Rosea'. Flower buds pink. Flowers usually changing to white. CR, DA, EI, KL, LO, ME, SR, WG, WN, 10, 22, 23, 25.

Winter-hazel

***Corylopsis pauciflora* (6)**

Dense shrub to 5 ft. with primrose yellow, bell-like flowers in early spring. Attractive small leaves. A graceful plant. BO, DA, GO, GR, LO, WG, 15.

***Corylopsis sinensis* (6)**

Loose, open shrub to 9 ft. with soft yellow flowers in early spring. A forsythia substitute for gardeners tired of bright yellow. BO, GO, LO.

Cotoneaster

***Cotoneaster multiflorus* and var. *calocarpus* (4)**

Graceful shrub to 8 ft. with arching branches and light red or pink berries. The white flowers are only 1/2 in. across but freely produced. DU, VA, WU, 8, 14.

For other *Cotoneaster* see pages 51, 62.

Broom

Cytisus 'Hollandia' (5)

To 6 ft. Purple-red flowers in May. CL, FX, KE, OL, SR, WG, 7, 19, 25.

Cytisus praecox (multiflorus x purgans) (5)

WARMINSTER BROOM

Shrub to 4 ft. or more. Sulfur-yellow pea-like flowers along arched, slender green stems. Early May. This and other brooms need well-drained soil and perform well in predominantly sandy soil. CL, CR, DB, FX, KE, OL, WG, WN, WO, 7, 10, 15, 19, 22, 25.

Cytisus scoparius (5-4B)

SCOTCH BROOM

Shrub to 6 ft. with fairly large, bright yellow flowers a bit later than *C. praecox*. DA, GA, KE, 12, 15, 20, 25.

Dwarf Cytisus: See page 63.

Deutzia

Deutzia gracilis (5-4B)

SLENDER DEUTZIA

Mound-like shrub to 3–4 ft. Upright racemes of white flowers in mid-May. BU, CL, FI, KE, KL, ME, WG, WT, WU, 2, 6, 10, 16, 18, 20, 22.*

Deutzia lemoinei (gracilis x parviflora) (4)

To 6 ft. Many small white flowers in mid-May. 8, 10.

Named form: 'Compacta'. To 4 ft. WU, 6, 21.

Deutzia rosea (gracilis x purpurascens) (5-4B)

Compact shrub to 4–5 ft. with bell-shaped flowers, pink outside. Mid-May. CL, DA, KR.

Deutzia scabra 'Pride of Rochester' (4)

Erect shrub to 7–8 ft.; 4½-in.-long spikes of double white flowers, a bit later than most deutzias. Flowers with a slight tinge of pink. BU, KE, ME, WB, 10, 16, 18.

Disanthus

Disanthus cercidifolius (6)

Witch-hazel relative with small dark purple flowers in early autumn. An open-growing shrub to 6 or 7 ft. with rounded leaves that become vivid red in fall. Shade tolerant. GO.

Enkianthus

Enkianthus campanulatus (4)

Tall upright shrub with refined foliage. Dainty yellow bell-shaped flowers with red veins. Early May. Leaves turn brilliant scarlet or yellow in autumn. Acid soil. BO, CG, CU, FO, GI, GO, GR, KE, OL, SR, WG, WN, 7, 10, 15, 18, 22, 25.

Enkianthus perulatus (5)

Compact shrub to 6 ft. White bell-like flowers in

late April. Vivid red autumn leaf color. BO, CU, GR.

Pearl-bush

Exochorda macrantha 'The Bride' (racemosa x korolkowii) (5-4B)

Mounded shrub to about 4 ft. Conspicuous 2-in.-wide white flowers in late April. Handsome. CL, WG, WT, 6.

Exochorda racemosa (grandiflora) (4)

Slender spreading shrub to about 8 ft. tall. Hardier than the preceding plant, but with slightly smaller flowers. 10.

Forsythia

Forsythia intermedia (suspensa x viridissima) (5)

Upright shrub to 7–8 ft. with long, spreading branches. Showy yellow flowers in early April. *Selected forms:* Farrand hybrids ('Beatrix Farrand'). Vivid yellow flowers often 2-in. wide. WB, WG, 6, 8, 21.

'Karl Sax'. Similar to the preceding but apparently harder in bud. GU, IT, LA, ST, WN, 8, 10, 17, 25.

'Lynwood' ('Lynwood Gold'). Golden yellow. BU, GI, IT, KL, KR, MC, ME, OL, WB, WN, 2, 6, 8, 10, 11, 16, 21.

'Spectabilis'. Deep yellow. DA, EI, FO, KE, KL, ST, WU, 6, 8, 10, 13, 16, 18, 22.*

'Spring Glory'. Pale yellow. CL, EI, HR, KE, KL, LA, SR, WG, WN, 2, 8, 10, 12, 16, 18, 21.

Hardier (Zone 4) selections from this and several other groups of forsythia available from DB, IT, MC, WG, 6.

Forsythia ovata (4)

EARLY FORSYTHIA

Spreading shrub to about 4 ft. tall. Pale yellow flowers about a week before other forsythia. Not as showy as *intermedia* forms, but hardier. JU, WN, WU.

Selected form: 'Tetragold'. Large bright yellow flowers. Slightly less vigorous than others of its kind. WN, 6.

Forsythia suspensa 'Sieboldii' (4)

SIEBOLD WEEPING FORSYTHIA

Slender, trailing stems characterize this form. Most effective when allowed to droop over a wall. Much of what is sold simply as *F. suspensa* is likely this form. EI, KE, WG, WN, WU, 6, 10, 12, 16, 18, 21, 22.

For other Forsythia see page 64.

Fothergilla

Fothergilla gardenii (5)

Compact grower to 3 ft., a diminutive version of the following species. GO, HO, WG, WX.

Fothergilla major (monticola) (5-4B)

Slow-growing upright shrub to 6-7 ft. White flower spikes in early May resemble small bottle brushes. Foliage, often a fine scarlet in autumn, is similar to witch-hazel but more refined. Choice. DA, EI, GO, WN, WX, 8, 10, 15, 18.

Witch-hazel

Hamamelis intermedia 'Arnold Promise' (mollis x japonica) (4)

Large shrub, broader than tall at maturity, with numerous yellow flowers in late winter. CL, FX, GO, KE, SR, WG, WN, 7, 10, 22, 25.

Other hybrids and cultivars: CL, FX, GI, GO, GR, 15, 28.

Hamamelis mollis (5-4B)

CHINESE WITCH-HAZEL

Tall open-growing shrub valued in moderate climates for its spidery golden-yellow fragrant flowers in mid-winter. In cold areas it flowers in early spring. In New York City it usually starts to bloom in late January, the flowers continuing into March. BO, GI, GO, GR, KE, SR, WN, 10, 15, 22, 28.

Selected form: 'Brevipetala'. Flowers showier than in the species. GI, GO, WN, 28.

Hamamelis vernalis (5)

SPRING WITCH-HAZEL

Dense shrub to 5 ft. or more. Fragrant tiny yellow flowers appear from December to April, depending on climate. In New York City it usually flowers in a mild January. GO, HO, KE, WG, 8, 10, 22, 23.

Hamamelis virginiana (4-3B)

COMMON WITCH-HAZEL

Tall shrub with spidery yellow flowers in autumn. More conspicuous than *H. vernalis* but less showy than *H. mollis*. Most *Hamamelis* have good yellow autumn color. EI, GA, GI, HO, KE, LO, ME, MU, SR, SS, WN, 2, 8, 10, 11, 17, 18, 22, 23.

Rose-of-Sharon

Hibiscus syriacus (5)

Stiffly branched tall shrub or small tree. Valued mainly for its mallow-like flowers in summer. Late to leaf out. Try to buy young specimens in spring. Unusually tolerant of urban conditions. Because of the varied flower color, it is wise to purchase named forms. The following have single flowers 3-3½ in. across.

'Bluebird'. Flowers blue, with a slight lavender tinge. FI, IT, KL, WG, WO, 6.

'Diana'. White, long-flowering, sterile. LO, WG, WO, 16, 20, 22.

(Note: the somewhat less attractive double-flowering forms of rose-of-Sharon may be obtained from most nurseries.)

Hydrangea

Hydrangea arborescens 'Grandiflora' (4)

HILLS-OF-SNOW

Rounded bush to 3-4 ft. Slightly flattened snowballs of white flowers, beginning in July. KE, KL, ST, 6, 8, 10, 22.

Other form: 'Annabelle'. Flower clusters larger. CL, CR, EI, HO, IT, JU, KR, LA, LO, SR, WG, WN, 6, 17, 21.

Hydrangea macrophylla (6-5B)

HOUSE HYDRANGEA, HORTENSIA

Rounded shrub to 3-4 ft. in the North, taller in the South. Flowers blue in acid soil, pink in alkaline soil. Rounded flower clusters, 5-10 in. or more in diameter. Summer-blooming, especially good in coastal areas. Many named forms. BU, CL, KL, LA, ME, ST, 16, 18, 19, 20.

Two hardier forms of note: 'Domotoi' (4). DA, 19.

'Nikko Blue' (4). CL, CR, IT, KE, KR, LO, ME, OL, SR, WB, WN, 2, 6, 10, 11, 18, 21, 25.*

Hydrangea paniculata ('Praecox,' 'Tardiva') (4-3B)

PANICLE HYDRANGEA

Tall summer-flowering shrub with 8-10-in., pyramidal clusters of partly sterile, partly fertile flowers. KE, ME, WT, 8.

Hydrangea paniculata 'Grandiflora' (4-3B)

PEEGEE HYDRANGEA

Similar to the preceding, but the more conspicuous flower clusters, nearly all sterile, appear in August. Very common and showy but coarse. BU, CL, FI, GI, IT, JU, KE, KL, KR, PL, WB, WU, 2, 6, 10, 11, 12, 21, 22.*

Hydrangea quercifolia (6-5B)

OAK-LEAF HYDRANGEA

Broad, suckering shrub to 4-5 ft. tall. Showy white flowers in early summer, not always produced in New England. Foliage coarse but distinctive. Often shows good red autumn color. Shade-tolerant. CL, DA, EI, FO, HO, KE, LO, ME, OL, SA, SR, WG, WN, WX, 2, 8, 10, 18. *Named forms:* LO, WG.

Hydrangea serrata 'Preziosa' (5)

Rounded shrub to 4 ft. with clusters of deep pink flowers over a long period in summer. Bronzy foliage. KL, SS.

Jasmine

Jasminum floridum (7)

SHOWY JASMINE

Half-evergreen shrub from China to 4-ft. Many small yellow flowers in terminal cymes. Summer-flowering. KE, 20.

Jasminum nudiflorum (6)

WINTER JASMINE

Dense shrub to 5 ft. or more. Twigs green. Small yellow forsythia-like flowers in late winter.

Flowering is often sparse in the North. More reliable in the mid-Atlantic states. DA, ME, WB, WG, WX, 12, 15, 16, 19.

Mountain-laurel

Kalmia latifolia (4)

Dense evergreen shrub growing rather slowly to 12 or more ft. May be kept to smaller height by selective pruning, or may even be trained as a small tree. The small white or pink-tinged flowers that appear in late May or June are attractive from near or far. Shade-tolerant. Acid soil. Splendid. CL, CR, DA, EI, KE, KL, KR, ME, OL, WG, WN, WU, 3, 6, 8, 10, 16, 18, 22.*
Selected forms (red-budded, pink-flowered, etc.): FX, GO, GR, OL, SS, WN, WO, 15.

Kerria

Kerria japonica (4)

SINGLE-FLOWERED KERRIA

Shrub to 4 ft. with 2-in.-wide bright yellow flowers in early May. Flowers single. Green stems provide winter interest. Shade-tolerant. KE, LA, WB, WG, WN, WU, WX, 8, 10, 18.
Selected form: 'Variegata' ('Picta'). Variegated white foliage. Dense mound. DB.

Kerria japonica 'Pleniflora' (4)

DOUBLE-FLOWERED KERRIA

Dense shrub to 6-8 ft. with conspicuous globe-shaped flower clusters in early May. Occasional flowers in summer. Thicket-forming. CL, DI, KE, KL, LA, ME, SS, WG, WN, WU, 2, 6, 22.

Beauty-bush

Kolkwitzia amabilis (4)

Vigorous, tall-growing, vase-shaped shrub. Showy pink flowers a bit later than most other spring-blooming shrubs. Flower color variable. BU, JU, KL, KR, ME, PL, SR, WB, WG, WN, 6, 10, 17, 18, 20, 21, 23.*

Crape-myrtle

Lagerstroemia indica (7-6B)

Shrub to 10 ft. or more, or a small tree with attractive mottled bark. Beautiful in flower in the summer. Color ranges from pink to red or white, depending on the particular shrub. May be treated as a die-back in warmer parts of the North, but it is most spectacular in the South. Many named forms.

Selected forms: 'William Toovey'. Deep rose. LO, 13, 16.

'Crape Myrtle' series, 3-4 ft. FI, LO, ME, WG.

'Muskogee'. USDA hybrid with *L. fauriei*, having attractive mottled bark and light lavender flowers. 30.

Bush-clover

Lespedeza bicolor (4)

Medium-sized shrub with rose-purple flowers in late summer. Drought tolerant. FO.

Honeysuckle

Lonicera fragrantissima (6-5B)

WINTER HONEYSUCKLE

Vase-shaped shrub to 7 ft. or more. Twiggy. Highly scented small flowers in early spring. Leaves retained until late autumn. CL, EI, FO, HO, KR, ME, ST, WG, WN, WT, 2, 10, 11, 12, 16, 18, 22, 23.

Lonicera morrowii (3)

Dense shrub to 5-6 ft., usually broader than tall. Yellowish-white flowers in mid-May. Dark red berries in early summer. EI, WU, 11, 12, 18, 22.

Lonicera tatarica (3)

TATARIAN HONEYSUCKLE

Vigorous shrub to 8 ft. or more. Handsome flowers in mid-May, followed by red berries in early summer. Like most honeysuckles, it is tolerant of poor soil.

Selected forms: 'Alba'. White flowers. 8, 10, 16, 22.

'Arnold Red'. Darkest red flowers of any honeysuckle. CL, IT, MC, VA, WG, 6, 23.

'Lutea'. Pink flowers and showy orange-yellow berries. WN.

'Rosea'. Pink flowers. CR, HO, KL, WN, 6, 8, 10, 11, 12, 18.

'Zabelli'. Dark red flowers. Excellent. BU, EI, GI, HO, JU, KL, MC, ME, SR, WN, WU, 6, 8, 11, 16, 18, 20, 21, 22.

For other *Lonicera* see pages 53, 66.

Loropetalum

Loropetalum chinense (7)

Evergreen shrub to 8 ft. with white, witch-hazellike flowers in late winter and early spring. Attractive in the South. HR, LO.

Magnolia

Magnolia quinquepeta 'Nigra' (soulangiana nigra, liliflora nigra) (6-5B)

LILY-FLOWERED MAGNOLIA

Spreading shrub to 8 ft. or more. Flowers dark purple outside, light purple inside. Flowers mid- or late May after the common spring-blooming magnolias. EI, ME, WB, WG, 15, 20.

Magnolia quinquepeta x stellata (5)

KOSAR-DEVOS HYBRIDS

A series dubbed "The Eight Little Girls," e.g., shrubs named Ann, Betty, Jane. Flowers range from pink to purple, some with white. Intermediate with parents. GO, LO.

Magnolia stellata (5-4B)

STAR MAGNOLIA

Shrub or small tree to 10 ft. or more. Showy white flowers in early spring. In the North it is best planted in an unprotected spot so that the flowers, which are often damaged by spring frosts, will be delayed a few days. Technically a variant of *M. kobus* though the garden differences are many. Of interest every season of year. BU, KE, KL, KR, ME, OL, WB, WN, WU, 10, 12, 15, 16, 17, 18, 22, 25.

Selected forms: 'Centennial'. Profuse-flowering Arnold Arboretum selection. GO.

'Royal Star'. Flowers larger, reportedly hardier in bud. BR, FI, GO, LO, ME, SR, 3, 4, 15, 17, 20, 23, 29.

'Rubra'. Pink flowers. (Another form, 'Rosea,' is usually pink only in bud.) LO.

'Waterlily'. Flowers slightly larger than in the species, tinged peppermint. Bushy, upright. GO, GR, LO.

For other Magnolias see pages 17, 30.

Sargent Crab-apple

Malus sargentii (4)

Dense shrub to about 6 ft., often broader than tall. Attractive white flowers in early May. Very small red fruit sometimes retained into winter. CL, EI, FO, FX, HR, KE, ME, OL, SR, WN, WU, 3, 10, 14, 18, 21, 22, 23.

Mock-orange

Philadelphus coronarius (4)

COMMON MOCK-ORANGE

Shrub to 7-8 ft. Intensely fragrant white flowers, 1-1½ in. across, late May. Much of the material in the trade may be a scentless larger-flowered hybrid. Advisable to purchase locally at time of flowering so that fragrance may be verified.

Philadelphus lewisii (4)

Compact shrub to 4 ft. or more. Scentless white flowers in late May. BO, FO, SI, YE.

Selected form: 'Waterton'. AE, WU.

Philadelphus 'Minnesota Snowflake' (4-3B)

To 8 ft. Fragrant white flowers, 2 in. across. HO, JU, KE, KL, KR, MC, SR, WB, WG, WN, WU, 6, 8, 11, 20, 21, 23.

Selected form: 'Miniature Snowflake'. To 4 ft. JU, MC, PL, 8, 20, 23.

Philadelphus 'Silver Showers' (4)

Dense, to 4 ft. or more. Flowers single. WG, WN.

Philadelphus virginialis 'Virginal' (4)

VIRGINAL MOCK-ORANGE

Leggy shrub to 7 ft. or more. Highly fragrant double-white flowers, 2 in. across. BR, BU, CL, GI, GU, KL, LA, MI, SR, WB, WG, WU, 6, 10, 11, 16, 18, 20, 21.*

Pieris

Pieris japonica (6-5B)

JAPANESE PIERIS (ANDROMEDA)

Refined evergreen shrub to about 7 ft. Drooping clusters of white bell-shaped flowers over a long period in April. Of year-round interest. Commonly and misleadingly called "andromeda." Member of heath family. BU, CL, GI, GR, HE, KE, KL, ME, MU, OL, PA, WB, 2, 3, 6, 8, 16, 18, 22.*

Selected forms: 'Brouwer's Beauty', actually a hybrid with *P. floribunda*. Prolific flowering with slightly arched clusters. Somewhat hardier than *P. japonica*. FX, OL, SS, WN, 25.

'Valley Valentine'. Red buds, deep pink flowers. FX, GR, WG, 4.

'White Cascade'. PO, WN, 20, 29.

Other selections: CL, CR, FX, GR, OL, SR, SS, WG, WN, 4, 5, 7, 15, 18, 25, 26, 29.

Pieris taiwanensis (7-6B)

TAIWAN PIERIS

Evergreen shrub to about 5 ft. Long drooping clusters of white flowers in early spring. GR, PO.

For other Pieris see page 67.

Cherry, Flowering Almond

Prunus besseyi (3)

WESTERN SAND CHERRY

Shrub to 5-6 ft. with attractive small white flowers in early May. More-or-less edible purplish-black cherries in early summer. Foliage lustrous. FO, ME, 14, 21.

Selected form: 'Hansen'. Abundant flowers and fruit. FI, GU, IT, KL, KR, MI.

Prunus tomentosa (3)

NANKING OR MANCHU CHERRY

Shrub to 6-7 ft. with showy white flowers in mid-April, followed by conspicuous red fruit. Attractive bark and foliage. FI, FO, GU, IT, JU, MU, PL, WN, WT, 6, 8, 11, 18, 21.

Prunus triloba (triloba 'Multiplex') (4-3B)

FLOWERING ALMOND

Spreading shrub to 8 ft. or more. Showy double pink flowers in mid-April. BU, FI, JU, KE, KL, KR, MC, PL, VA, WG, WU, 6, 8, 10, 21.

For other Prunus see pages 14, 32, 55, 68.

Pomegranate

Punica granatum (7)

Deciduous shrub to 8-10 ft. with scarlet flowers in May, June. Double-flowered form is the most common. HR, WX, 12.

Selected form: 'Nana'. LO, ME.

Azalea

Rhododendron arborescens (4)

SWEET AZALEA

Shrub to 6 ft. or more. Fragrant white flowers in



The native Carolina rhododendron (*R. carolinianum*) has rosy-purple to pink flowers in May.

early June. Azaleas are part of the large rhododendron genus, but for clarity most nurseries list them separately. CU, GR, SA, WX, 10.

Rhododendron bakeri (6)

Compact grower to 4 ft. or more with vivid orange-red flowers in early summer. CG, CU, OL, SR, WB, WT, WX, 7.

Rhododendron calendulaceum (5-4B)

FLAME AZALEA

Shrub to 6-8 ft. with showy and long-lasting orange flowers in late May. Flowers sometimes yellow or scarlet. CG, CU, DU, GA, GI, KE, OL, SA, SR, WB, WX, 7, 10, 22.

Rhododendron canadense (3-2B)

RHODORA

Azalea to 3 ft. with rose-purple flowers in late April. Best grown under cool, moist conditions. For the natural garden. CU, GI, GR, OL, WN.

Exbury Azaleas (6-5)

Deciduous hybrids of complex parentage. Large flowers, ranging in color from orange to pink, red and creamy white. Eventual height 8 ft. or more. Best to purchase named forms.

Named forms: BO, BU, CG, CL, CU, GI, KE, KL, OL, SR, WG, WO, WU, 4, 5, 6, 10, 15, 16, 25.*

Rhododendron gandavense (4)

GHEENT AZALEA

Mixed hybrid deciduous azaleas to 5 ft. or more.

Flowers white to pink and orange. Some double-flowered. Many named forms.

Named forms: BO, GI, GR, WN, WU.

Glenn Dale Azaleas (based on *R. obtusum*) (6-5B)

Semi-evergreen shrubs to 4 ft. or more. Flowers range from red to pink and white and lavender. Many outstanding named forms. CG, GR, KE, TH, WN, 19, 20.

Rhododendron kaempferi and hybrids (5-4B)

TORCH AZALEA

Dense deciduous shrub to 6 ft. or more. Flowers from red to pink and orange. Free-flowering. CG, CR, EI, GR, KE, WN, WU, 2, 4, 8, 10, 18, 20.

Rhododendron kiusianum (obtusum japonicum) and hybrids (7-6)

KURUME AZALEAS

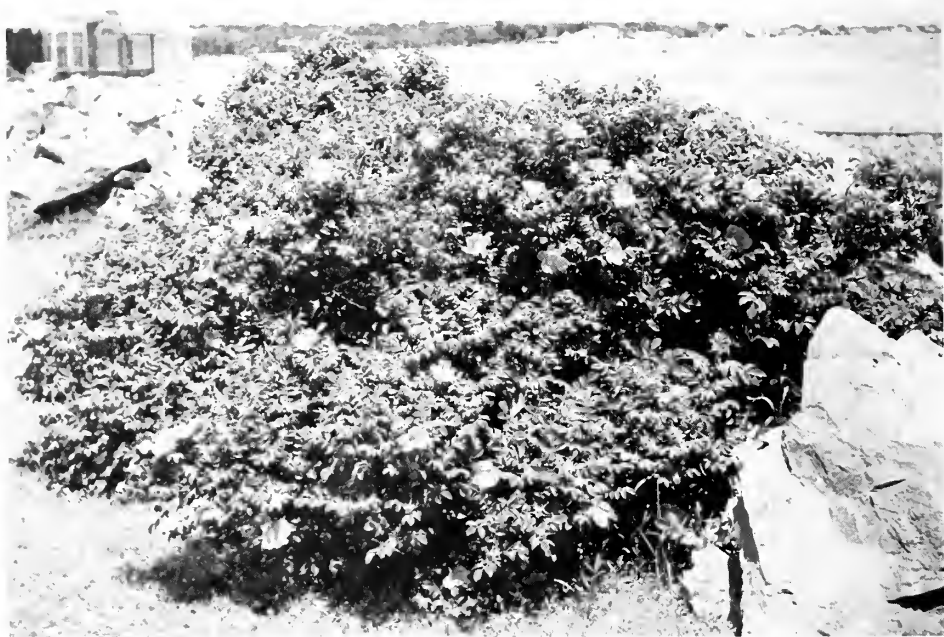
Dense evergreen shrubs to 3 ft. Single or double flowers ranging in color from white to pink and red. Considerable variability in hardiness, some being hardy as far north as Long Island.

Named forms from: AL, CG, CR, CU, GR, HR, NU, OL, SH, SR, TH, WN, 10, 18, 19, 22, 25, 29, 30.*

Rhododendron kosteranum (molle x japonicum) (5)

MOLLIS HYBRID AZALEAS

Deciduous shrubs to about 5 ft. Showy yellow to red flowers in mid- to late May. Many named forms. KE, KR, WN, 16, 29.



Rosa rugosa, a magenta to white single rose, has dense growth with interesting textured leaves and splendid rosehips in autumn. Very good in sandy soil.

Rhododendron molle (5)

CHINESE AZALEA

Shrub to 5–6 ft. with yellow flowers in mid-May. Many plants listed as such are probably hybrids with *R. japonicum*. E1, F1, G1, GR, IT, KE, KL, MC, ME, SR, WU, 6, 10, 15, 18, 25, 26.

Rhododendron mucronatum (ledifolium album) (6-5B)

SNOW AZALEA

Excellent dense evergreen or nearly evergreen shrub to 4–5 ft. Fragrant white flowers in late April. Not always of reliable hardiness in New England. GR, WN, WT, 10, 16, 18.

Rhododendron periclymenoides (nudiflorum) (4-3B)

PINKTERBLOOM AZALEA

Shrub to 5–6 ft. with light pink flowers in mid-May. Deciduous. CU, GA, KE, SA, SS, WG, WX, 10, 16, 22.

Rhododendron prinophyllum (roseum) (4-3B)

ROSE-SHELL AZALEA

Deciduous, to 6 ft. or more. Fragrant bright pink flowers in mid-May. CG, CU, KE, OL, SA, WN.

Rhododendron prunifolium (6B)

Open growing shrub to 8 or 9 ft. with orange-red flowers in mid- or late summer. CG, G1, LO, OL, SA, SR, WB, WX, 7.

Rhododendron schlippenbachii (4)

ROYAL AZALEA

Ultimately a tall shrub (to 15 ft.). Fragrant large flowers, usually a good pink, in full bloom usually by early May. Good autumn color. CG, CU, DA, GR, OL, WG, WN, WU, 7, 8, 10, 15, 29.

Rhododendron vaseyi (4)

PINK-SHELL AZALEA

Shrub to 5–6 ft. with light rose flowers in early May. Usually good autumn color. CG, CU, GA, G1, GO, KE, OL, SS, WN, WU, 7, 10, 15. *White selections*: WN, WU.

Rhododendron viscosum (3)

SWAMP AZALEA

Shrub to 6–8 ft. with intensely fragrant, white or whitish-pink flowers in early summer. Good autumn color. Tolerant of wet sites. CU, GA, G1, KE, OL, SR, WN, WU, WX, 7, 10, 15, 22.

Rhododendron yedoense poukhanense (4)

KOREAN AZALEA

Dense shrub to 3–4 ft. with fragrant petunia-purple flowers in early May. Deciduous or semi-evergreen. Often listed as *Azalea poukhanensis*. CG, CL, CR, GR, KE, SS, WG, WN, WT, WU, 10, 22.

For other Azaleas see end of Rhododendron listing; also BO, CG, CL, G1, GR, HE, HR, NU, PR, WN, WU, 6, 10.

For Dwarf Azaleas and Rhododendrons see page 68.

Rhododendron

Rhododendron carolinianum (5-4B)

CAROLINA RHODODENDRON

Compact shrub to 4-5 ft. with handsome short evergreen leaves. Light rosy-purple to pink flowers in early May. CU, DA, EI, GA, GI, KE, OL, SS, WB, WN, 10, 18, 25, 29.

Selected form: 'Album'. CU, GA, WN, 18, 29.

Rhododendron catawbiense (4)

CATAWBA RHODODENDRON

Shrub to 5 ft. or more, 5-in.-long evergreen leaves. Rose-purple flowers in late May. GA, KE, KL, WB, WN, 6, 10, 18.

There are many named *catawbiense* hybrids with flowers ranging from red and purple to white.

Hybrids: CL, CR, WN, WU, 2, 3, 4, 5, 6, 8, 10, 18, 22, 25, 26, 27, 29.

Rhododendron fortunei (6)

FORTUNE RHODODENDRON

Shrub to 8 ft. or more with long evergreen leaves. Rosy-lilac or bluish-pink flowers in mid-May. BO, GR, WX.

Rhododendron laetevirens (carolinianum x ferugineum) (5-4B)

WILSON RHODODENDRON

Compact evergreen shrub to 4-5 ft. grown more for its pieris-like leaves than its small purplish-pink flowers in late-May. Usually listed as *R. wilsonii*. BO, CG, CR, CU, DA, DB, OL, PA, SS, WA, WN, WU, 2, 7, 10, 18, 25, 27.

Rhododendron maximum (4-3B)

ROSE BAY RHODODENDRON

Tall evergreen shrub, almost tree-like to 20 ft. or more under good growing conditions. Flowers rose to purple-pink in mid-June, often obscured by the long leaves. Useful because of its exceptional hardiness. DA, EI, GA, GI, KE, KL, OL, SR, SS, WB, WN, 10, 18, 22, 29.

Rhododendron mucronulatum (4-3B)

KOREAN RHODODENDRON

Deciduous shrub to 5-6 ft. with rose-purple flowers in late March or early April. Repeat flowering in mild autumns. Buds sometimes suffer frost injury in parts of New England. Azalea-like in appearance, but a true rhododendron. CG, DA, GI, GR, KE, OL, SR, SS, WG, WN, WT, WU, 6, 8, 10, 18, 29.

Named form: 'Cornell Pink'. Clear pink, GR, OL, SR, SS, WU, 25.

Other selections: CG, CU, WN.

Rhododendron smirnowii (4)

SMIRNOW RHODODENDRON

Evergreen shrub to 6 ft. or more. Numerous white to rosy-red flowers in mid-May. Leaves woolly-white beneath. 10, 27.

Named hybrid rhododendrons available from many firms, including CL, CU, PR, 3, 4, 5, 25, 27.* Some of more than passing note are 'Boule de Neige' (white flowers); 'Ben Moseley' (pink);

'Caroline' (fragrant pink flowers); 'Cham-pagne' (cream); 'Christmas Cheer' (early white flowers on compact shrub); 'Cunningham's White' (white); 'Duke of York' (pale lilac); 'Janet Blair' (pink); 'Kettledrum' (magenta with yellow markings); 'Lady Armstrong' (magenta with deeper markings); 'Lee's Dark Purple'; 'Pink Twins' (semi-double flowers); 'Pioneer' (early rose-colored flowers); 'Roslyn' (late purple); 'Scintillation' (pink); 'Vulcan' (red); 'Westbury' (pink); 'Wheatley' (pink).

For Dwarf Rhododendrons see page 68.

Currant

Ribes aureum (2)

GOLDEN CURRANT

Vigorous shrub to about 6 ft. with conspicuous yellow, usually fragrant flowers in late April. Many currants serve as alternate hosts for white pine blister rust and should not be planted where 5-needle pines are prevalent. FO, 6, 8.

Ribes sanguineum 'King Edward VII' (5)

Shrub to 4-5 ft. with small dark green leaves. Red flowers in early May. More satisfactory in New York City than most plants from the Northwest, but will occasionally suffer winter injury. WG, WN, 15.

Rose

Rosa harisonii (foetida x spinosissima) (4)

HARISON'S YELLOW ROSE

Shrub to 4-5 ft. with attractive double yellow flowers in late May. Fruits inconspicuous. The rose species that follow are of simple culture and do not need the coddling associated with hybrid teas. The fruits or "rose hips" of many species are an attraction to wild-life. MC.

Rosa hugonis (5-4B)

FATHER HUGO ROSE

Shrub to 5-6 ft. with single yellow flowers in mid-May. Important because it is usually the first rose to bloom in spring. Fruits dark red. CR, KE, KL, WN, WU, 10.

Rosa multiflora (5-4B)

MULTIFLORA OR JAPANESE ROSE

Strong-growing shrub to about 8 ft. Numerous small white flowers in early June. Long-lasting small red fruits in autumn. Valuable shrub for wild-life, but has become weedy in many areas. GU, KL, MC, MU, WB, WN, 6, 11, 12, 18, 22.

Rosa rubrifolia (2)

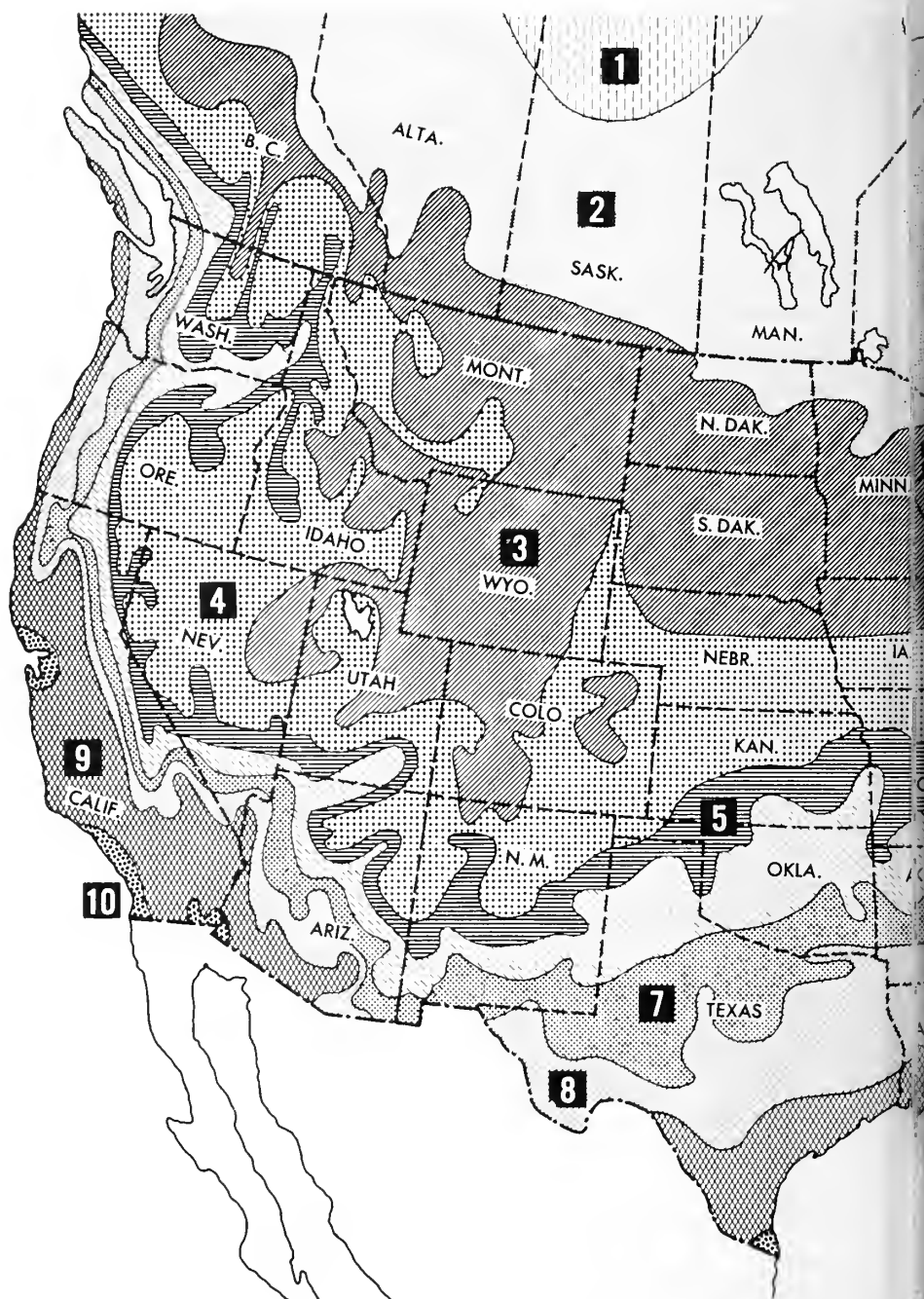
REDLEAF ROSE

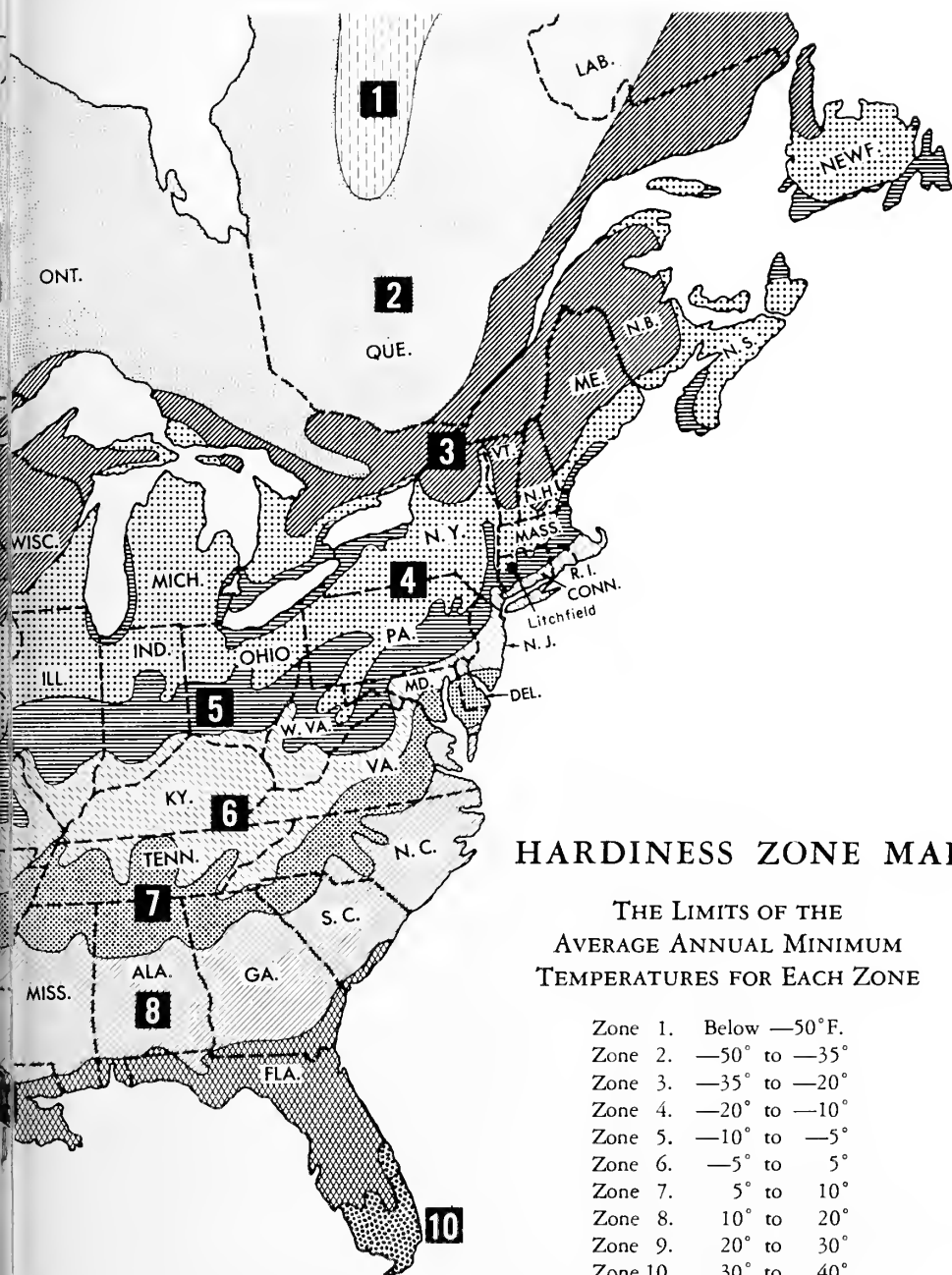
Shrub to 6 ft. grown more for its gray foliage, which is suffused purplish-red, than for the small red flowers appearing in late May. FO.

Rosa rugosa (3-2B)

RUGOSA ROSE

Variable shrub to about 5 ft. with attractive





HARDINESS ZONE MAP

THE LIMITS OF THE
AVERAGE ANNUAL MINIMUM
TEMPERATURES FOR EACH ZONE

Zone 1.	Below -50°F.
Zone 2.	-50° to -35°
Zone 3.	-35° to -20°
Zone 4.	-20° to -10°
Zone 5.	-10° to -5°
Zone 6.	-5° to 5°
Zone 7.	5° to 10°
Zone 8.	10° to 20°
Zone 9.	20° to 30°
Zone 10.	30° to 40°

Compiled by The Arnold Arboretum, Harvard University

wrinkled foliage. Flowers range from magenta to white, late May. Occasional flowers produced in summer. Showy red fruits from summer to autumn. Good orange fall color. Especially useful along the seashore. CR, FI, FO, KE, KL, ME, MU, PA, SR, WG, WN, 3, 6, 10, 11, 16, 18, 22, 25.*

Selected form: 'Alba'. White flowers. CR, WG, WN, 10, 18, 22, 25.

Rugosa hybrids from: JU, MC, ME, WG, 6, 21.

For other Roses see page 69.

Nursery sources for shrub roses, see *Combined Rose List 1983* by Beverly R. Dobson, paperback, \$3.50 (available by mail from Mrs. Dobson, 215 Harriman Rd., Irvington, NY 10533).

Flowering Raspberry

Rubus odoratus (3)

Thornless shrub to 6-7 ft. with coarse maplelike foliage. Fragrant purplish-rose flowers in early summer. Edible fruit. Shade-tolerant. FO, GA.

Willow

Salix caprea (4)

PUSSY WILLOW (EUROPEAN GOAT WILLOW)

Vigorous shrub to 10 ft. or more. Effective in late winter with its velvety gray catkins upon which bright yellow stamens eventually appear (on staminate plants). Suited for moist soils, but will also grow well under average garden conditions. Prune severely in early spring for a good "crop" of pussy willows the following winter. Many of the plants listed under this name as pink pussy willow are likely *S. gracilistyla*. GI, JU, KE, KL, LA, WN, 6, 8, 16.

Named form: 'Pendula'. KILMARNOCK WILLOW. Low mound unless grafted. OL, WN.

Salix discolor (3-2B)

AMERICAN PUSSY WILLOW

Catkins slightly smaller than those of the preceding, but useful in northern areas. BU, EI, KE, ME, WG, 8, 10, 11, 17, 18, 26.

Salix gracilistyla (5-4)

KOREAN ROSE-GOLD PUSSY WILLOW

Shrub to 6-7 ft. Pinkish catkins and yellow stamens. WT.

Salix melanostachys (4)

BLACK PUSSY WILLOW

Strong-growing shrub to 10 ft. or more and as wide. The black pussies with red and yellow overtones which appear in late winter, are an interesting oddity. FO, ME, WG, WN, 20.

For other Willows see pages 15, 57, 70.

Ural False-spirea

Sorbaria sorbifolia (2)

Strong-growing shrub to 6 ft. with showy white flowers in early summer. Useful on banks. VA, WN, 6, 8.

Spiraea

Spiraea arguta (thunbergii x multiflora) (4)

GARLAND SPIREA

Handsome shrub to 5 ft, with white flower clusters. Resembles *S. vanhouttei* but blooms several weeks earlier. 8.

Selected form: 'Compacta.' WN.

Spiraea billiardii (douglasii x salicifolia) (3)

BILLIARD SPIREA

Upright shrub to 4-5 ft. Tall dense "steeples" of rose-colored flowers in mid-June. WN, 10, 22.

Spiraea macrothyrsa (douglasii x latifolia) (4)

Similar to the preceding, but with horizontal branches. KL, LA.

Spiraea nipponica (4)

SNOWMOUND SPIREA

Shrub to about 6 ft. with numerous flat clusters of small white flowers in mid-May. Foliage nearly bluish-green. CL, DB, EI, HO, JU, KE, ME, PA, WN, 2, 6, 8, 11, 15, 16, 17, 18, 20, 22.

Spiraea prunifolia (5)

BRIDAL-WREATH SPIREA

Shrub to 6-7 ft. with white buttonlike flowers in early May. Lustrous foliage turns orange-scarlet in autumn. DA, EI, FI, GI, KE, LA, MC, WB, WG, WN, 8, 10, 11, 18, 20, 22.

Spiraea thunbergii (4)

THUNBERG SPIREA

Slender-branched shrub to about 5 ft. Pure white flowers along the stems in late April. Needs more pruning than most spiraeas because its numerous small twigs die out unexpectedly. DA, KE, WB, WU, 8, 12, 18.

Spiraea trichocarpa (5)

KOREAN SPIREA

Spreading shrub to 6 ft.; 2-in. clusters of white flowers in late May. VA.

Spiraea trilobata (4-3B)

HAWTHORN-LEAF SPIREA

Shrub to 3-4 ft., resembling *S. vanhouttei* but smaller in every part. Mid-May. AE, VA, WU.

Named form: 'Swan Lake'. KL, WG, 17.

Spiraea vanhouttei (cantoniensis x trilobata) (4)

VANHOUTTE SPIREA

Dense shrub to 5-6 ft. with showy clusters of pure white flowers along arching branches. Mid-May. Common, with reason. BU, CL, FI, GI, GU, IT, KE, KL, KR, MC, WB, WU, 2, 6, 10, 11, 12, 16, 22.*

For other Spiraeas see page 71.

Stachyurus

Stachyurus praecox (6)

Spreading shrub to 7 or 8 ft. tall and at least as wide. Drooping clusters of pale yellow flowers in early spring are distinctive. BO, GO, WX.

Lilac

Syringa chinensis (rothomagensis) (laciniata x vulgaris) (4)

CHINESE LILAC

Shrub to about 10 ft. with loose panicles of purple-lilac flowers in mid-May. Leaves smaller than those of *S. vulgaris*. Incorrectly called "Persian lilac" in many catalogs. E1, GU, JU, KE, MC, PL, WG, WO, 8, 10, 17, 20, 21, 22.

Syringa josikaea (2)

HUNGARIAN LILAC

Shrub to 8 ft. or more. Lilac-violet flowers in late May. Leaves shiny green. VA, 20.

Syringa meyeri (5)

Dense shrub to 8 ft. with dark purple flowers in late April or early May. Not intensely fragrant. Lustrous foliage holds up well in summer heat. Non-suckering. IT, VA.

Selected form: 'Palibin' (palibiniana). Compact, fairly slow growing to 6 or 7 ft. Flowers lilac-purple. Tidy for a lilac, and the best one for the city. AL, BO, BU, CL, FO, ME, OL, SR, WG, WN, WO, WU, 2, 7, 10, 17, 18, 20, 23, 25.

Syringa microphylla 'Superba' (5)

DAPHNE LILAC FORM

A cultivar of the daphne lilac with deep pink flowers in early May. Modest repeat bloom. Broader than tall at maturity. Eventual height about 6 ft. CL, 6.

Syringa 'Miss Kim' (4)

Small-leaved shrub growing to 6 ft. Non-suckering. Flowers light lavender, appearing in May after the common lilac has bloomed. HO, KR, VA, WG, 7, 23.

Syringa persica (afghanica x laciniata) (4-3B)

PERSIAN LILAC

Multi-stemmed shrub to 5-6 ft. with small leaves. Pale lilac flowers in mid-May. Often confused with *S. chinensis*. BU, E1, F1, G1, HO, KE, VA, WB, WN, 8, 10, 11, 18.

Selected form: 'Alba'. Flowers white. E1.

Syringa prestoniae (reflexa x villosa) (2)

PRESTON LILAC

A hybrid group of lilacs growing to 8-9 ft., with attractive flowers ranging from pink to purple and white. Late May. Not very fragrant, but among the hardiest of all lilacs.

Selected form: 'James MacFarlane'. Flowers pink. CL, CR, FO, HO, JU, ME, SS, WG, WN, WU, 3, 10, 23, 25.

Other named forms: AE, CR, JU, VA, 6.

Syringa villosa (3-2B?)

LATE LILAC

Dense upright shrub to 7-8 ft. with rosy-lilac or white flowers. Late May. Not very fragrant. AE, WN, 6, 8, 10, 18.

Syringa vulgaris (3)

COMMON LILAC

Shrub to 15 ft. or more. Fragrant flowers in early

May. Color range: purple to pink, yellow and white. Flowers single or double. A rugged well-known dooryard shrub, but susceptible to mildew, scale and borers. Best to purchase "own-root" lilacs to avoid privet graft blight. Nearly all lilacs are prone to air pollution injury, especially *S. vulgaris* and its many forms. Better than average selection of named forms, often called "French hybrids," available from: BU, F1, G1, IT, JU, KE, KL, KR, MC, SR, WB, WG, WN, 6, 10, 11, 16, 17, 22.*

Tamarisk

Tamarix hispida (4?)

KASHGHAR TAMARISK

Shrub to 4 ft. or more, with silvery juniperlike leaves. Dainty racemes of pink flowers in the latter part of summer. Like other tamarisks, it grows well in dry, even sandy soil. Not always easy to establish. Best planted in spring, and pruned severely at planting time. DA.

Tamarix ramosissima (pentandra) (4-3B)

FIVE-STAMEN TAMARISK

Tall shrub with light green juniperlike foliage. Tolerant of coastal conditions. Pink flowers in mid-summer. Lankiness may be curtailed by a sharp pruning in early spring. 6.

Selected forms: 'Pink Cascade'. Flowers light pink. WN.

'Summer Glow' ('Rubra'). Flowers dark pink. CL, FO, GU, JU, WG, 21.

Viburnum

Viburnum burkwoodii (carlesii x utile) (5)

BURKWOOD VIBURNUM

Refined shrub, ultimately to 7 ft. or more. Shiny leaves retained late in autumn. Fragrant pinkish-white flowers in early May. GR, HO, KE, LA, ME, WG, WN, WT, WU, 2, 6, 10, 15, 18, 19, 20, 22, 26.

Viburnum carlcephalum (carlesii x macrocephalum) (5)

Open shrub to 6 ft. or more. Fragrant white flower clusters in mid-May. Despite a mediocre growth habit, it is one of the best viburnums in flower. CL, DA, HO, KL, ME, WG, WN, 6, 10, 15, 17, 20.

Viburnum carlesii (4)

KOREAN SPICE VIBURNUM

Broadly rounded shrub to about 5 ft. Clusters of fragrant, pinkish-white flowers in early May. Berries black, ripening in early summer, but not dependable. Often grafted on other viburnums. Beware of understock. CL, DA, E1, KE, LA, ME, PA, SR, WG, WN, WU, 6, 10, 15, 18, 20, 22, 23.

Selected form: 'Compactum'. 8, 10.

Viburnum farreri (fragrans) (5)

FRAGRANT VIBURNUM

Shrub to 6–7 ft. valued mainly for its scented white flowers in late March. Flower buds pink. The first viburnum to flower in the North. Fruits inconspicuous. BO, WU.

Viburnum juddii (carlesii x bitchiuense) (5)

JUDD VIBURNUM

Similar to *V. carlesii*, but with more handsome foliage. Flowers less fragrant. WG, WN, 17, 23.

Viburnum macrocephalum (m. 'Sterile') (6)

CHINESE SNOWBALL

Shrub to 8 ft. or more. Rounded 6-in. heads of sterile white flowers in mid-May. The most showy, if least hardy, of the snowballs. Leaves held late in autumn. 2, 20.

Viburnum opulus 'Roseum' (o. 'Sterile') (3)

EUROPEAN SNOWBALL

Tall loose shrub with showy flowers in mid-May. Because of its susceptibility to plant lice, it should be used only where *V. plicatum* is not hardy. None of the snowball forms bear fruit. CL, GU, KE, KL, PL, SR, WB, WU, 6, 10, 15, 17, 18, 19, 20, 21.

Viburnum plicatum (tomentosum 'Sterile') (4)

JAPANESE SNOWBALL

Shrub to 7–8 ft. with showy rounded heads of sterile white flowers in late May. Saw-toothed oval leaves with prominent veins. The best snowball for the North. CL, DA, KR, WB, WN, WT, 2, 10, 12.

Viburnum plicatum 'Mariesii' (4)

MARIES DOUBLE-FILE VIBURNUM

Flat flower clusters surrounded by large sterile florets. Horizontal branching, with flower clusters produced along the branches. Free-blooming. One of the finest flowering shrubs, but it needs much room for proper development. Superb when seen from a second-floor window. Red berries. CL, DA, EI, FO, GR, WG, WN, 2, 3, 8, 15, 16, 18, 19, 23, 26.

Viburnum plicatum 'Roseum' ('Pink Beauty') (4)

PINK DOUBLE-FILE VIBURNUM

Similar to the above, but with flowers fading pink over a long period. An attractive, rather slow-growing form found many years ago in the Brooklyn Botanic Garden. Best with age. CL, 16, 19.

Viburnum plicatum 'Rotundifolium' (4)

EARLY JAPANESE SNOWBALL

Flowers two weeks earlier than the Japanese snowball. BO.

Viburnum plicatum tomentosum (V. tomentosum) (4)

DOUBLE-FILE VIBURNUM

Similar to 'Mariesii', but slightly less showy in bloom. Despite its curious nomenclature, this is the species found wild in Japan and China—and the Japanese snowball is a garden form of it. DA, HO, KE, ME, PA, SR, WT, WU, 8, 10, 11, 16, 18, 22, 25.

Viburnum pragense (rhytidophyllum x utile) (6)

PRAGUE VIBURNUM

Medium-sized spreading shrub with handsome leathery elliptic leaves that are evergreen. Creamy white flowers in late spring. BO, CL, GR, 2, 15.

Viburnum sieboldii (5-4B)

SIEBOLD VIBURNUM

Tall shrub, sometimes tree-like, with lustrous 6-in.-long leaves. Flat, wide clusters of white flowers in mid-May. Red berries in summer. Distinctive when trained as a small tree. DA, EI, FO, HO, KE, ME, SR, WN, WT, 2, 3, 8, 10, 18, 22, 23.

Viburnum USDA Selections (5-6)

A series from the National Arboretum selected for flowers or fruits. *V. dilatatum* is prominent, but others are included. Most have American-Indian cultivar names. DB, GR, ME, WG, WN, 2, 19, 20.

For other Viburnums see pages 58, 71.

Vitex

Vitex agnus-castus 'Latifolia' (V. macrophylla) (5)

CHASTE-TREE

Large mounded shrub to about 10 ft. Graceful gray-green leaves. Valued for its lavender flower spikes in August. Advisable to treat as a die-back shrub in the northern part of its hardiness range. In New York City it requires some pruning each spring, but need not necessarily be treated as a die-back shrub. One of the last shrubs to leaf out in spring. CL, DA, FO, LO, WN, 2, 11.

Other form: 'Silver Spire'. Flowers white. CL, ME.

Weigela

Weigela hybrids (5-4B)

Rather uneven-growing, loosely mounded shrubs to 6–7 ft. Showy trumpet-shaped flowers in late April or early May. Weigelas need more than average pruning to look their best. Prune after flowering.

Selected forms: 'Bristol Ruby'. Flowers purplish-red. EI, HO, KE, KL, SS, WG, 3, 6, 18, 20.

'Bristol Snowflake'. Flowers white. KE, 20.

'Vanicek' ('Newport Red'). Purplish-red flowers. Slightly harder than others. (Some catalogs list as 'cardinal shrub.') BU, EI, GI, IT, JU, KL, KR, ME, WN, 2, 3, 11, 16, 17, 18, 22.*

For other Weigelas see page 59.

Zenobia

Zenobia pulverulenta (5)

Attractive white bell-shaped flowers in early June. Mounded growth to 5 or 6 ft. Gray-foliage form is the best. Sun, acid soil. BO, CU, WX.

SHRUBS PLANTED FOR FOLIAGE AND FRUITS

(*Deciduous unless otherwise noted*)

Those marked “” also available at most nurseries.*

Acanthopanax

Acanthopanax sieboldianus (Aralia pentaphylla) (4)

FIVE-LEAF ARALIA

Shade-tolerant shrub to 6-8 ft. with small palmately divided leaves retained until late autumn. Thorny. Good for city conditions and for hedges. Flowers inconspicuous. E1, WN, WU, 6, 8, 10, 18, 22.

Aralia

Aralia elata (4)

JAPANESE ANGELICA-TREE

Tall spiny shrub or small tree with large doubly compound leaves. Sparsely branched. Umbels of white flowers in mid-summer. Tropical appearance. 6, 8.

Chokeberry

Aronia arbutifolia (4)

RED CHOKEBERRY

Lanky shrub to 7 ft. or more. Attractive small white flowers in mid-May. Autumn foliage usually red, as is the fruit, which sometimes persists into winter. Good for wild-life plantings. DU, FO, KE, KR, LO, ME, PA, 8, 18.

Selected form: 'Brilliantissima'. Numerous brightly colored berries. CR, E1, HO, WB, WG, WN, 3, 8, 10, 12, 18, 22, 23, 25.

Aronia melanocarpa (4)

BLACK CHOKEBERRY

Smaller than the preceding. Berries purplish-black. DU, FO, KE, ME, WN, 8, 10, 18, 23.

Aucuba

Aucuba japonica (7-6B)

JAPANESE AUCUBA

Stout, eventually tall-growing shrub with thick glossy evergreen leaves. Dioecious, with pistillate plants bearing bright red berries. Best planted in shade. Hardier than forms with variegated leaves. DA, KE, WB, 12, 16.

Selected forms: 'Crotonifolia'. Leaves spotted white. ME, 19.

'Picturata'. Leaf center yellow, LO, ME, 19, 26.

'Variegata'. GOLD DUST TREE. Shrub with leaves spotted yellow. DA, LO, ME, SR, WB, 12, 13, 16, 19, 26, 30.

Barberry

Berberis julianae (5)

WINTERGREEN BARBERRY

Evergreen shrub to 6 ft. with larger, less refined leaves than most evergreen barberries, but of reliable hardiness. Some leaves turn brilliant orange-red in autumn, others remain green. E1, KE, ME, PA, WB, 3, 10, 11, 12, 14, 16, 18, 22, 30.

Selected forms: 'Nana'. Dense, to 3-4 ft. DA, 10, 12, 16.

'William Penn'. a hybrid with *B. verruculosa*, is a smaller shrub than *B. julianae* and has slightly more refined foliage. SR, 10, 18, 20, 22.

Berberis koreana (4-3B)

KOREAN BARBERRY

Dense deciduous shrub to 5-6 ft. with leaves turning dark red in autumn. Persistent red fruit. DU, FO, VA.

Berberis mentorensis (julianae x thunbergii) (5-4B)

MENTOR BARBERRY

Dense shrub to 5-6 ft. with leaves held late into autumn. Reported to withstand hot dry midwestern summers better than other barberries. DA, E1, HO, ME, WG, WN, 8, 10, 11, 12, 18, 20, 21, 22, 23, 26.

Berberis thunbergii (4)

JAPANESE BARBERRY

Common deciduous shrub to 5-6 ft., often used for hedges because of its dense growth, thorniness and small leaves. Fine red autumn color. Red berries held into winter. Tolerant of a wide range of conditions.

Selected forms: 'Atropurpurea'. PURPLE-LEAF BARBERRY. FO, HO, JU, KL, KR, MC, MU, ST, 10, 11, 12, 14, 16, 20, 21, 22, 26.*

'Aurea'. Leaves bright yellow if grown in full sun. Slow-growing. CL, FI, KL, KR, ME, MU, 13, 19.

'Rosy Glow'. Leaves first purple, then with

white markings. A novelty, but handsome if properly used. BR, FO, HO, ME.

For other **Barberries** see page 60.

Boxwood

Buxus sempervirens (6-5B)

COMMON BOX

Dense evergreen shrub to 10 ft. or more. Best development occurs in the mid-Atlantic states. Subject to snow damage and winter burn northwards. A common hedge plant in the South. Many kinds. EA, KE, LA, PA, WB, WN, WT, 3, 10, 11, 13, 18, 26.

Beauty-berry

Callicarpa dichotoma (purpurea) (5-4B)

KOREAN BEAUTY-BERRY

Upright shrub to 6-7 ft. Distinctive small lilac-violet berries in autumn. DA, DU, FO, KE, WT.

Callicarpa japonica 'Leucocarpa' (5)

WHITE-FRUITED BEAUTY-BERRY

To 5 ft. or more. Small but abundant white berries persisting in autumn. One of the best shrubs with white fruits. KE, WT, 19.

Pea-shrub

Caragana arborescens (3-2B)

SIBERIAN PEA-SHRUB

Tall upright shrub with fairly refined small compound leaves. Bright green. Yellow pea-like flowers in mid-spring. Mainly for the Northern Plains. Hedge plant. AE, EI, FI, FO, GU, KE, MC, SS, VA, WN, 6, 10, 18, 21.

Selected forms: '**Lorbergii**'. Feathery leaves. AE, VA, WN, 6, 18.

'**Pendula**'. Usually grafted as a standard, making a miniature tree. FX.

Cleyera

Cleyera japonica (7)

Tall shrub with glossy evergreen leaves. New growth red. Fragrant white flowers in summer followed by red berries. A choice plant for southern gardens. Some plants offered may be *Ternstroemia gymnanthera*. WX, 12, 16, 30.

Dogwood

Cornus alba (3-2B)

Vigorous shrub to 7 ft. or more. Grown for its winter twig color; also for the variegated leaves of some forms. The latter are more tender. Whitish berries have some late summer interest.

Forms grown for their bright red winter twigs: '**Sibirica**' ('**Westonbirt**'). This and

others should be pruned severely in very early spring to encourage strong new growth that will have good color the following winter. CL, DB, EI, KL, WG, WN, 2, 6, 8, 10, 11, 18, 21, 22, 26.

Forms grown for their variegated leaves:

'**Argenteo-Marginata**' ('**Elegantissima**'). Leaf margins white. CL, FO, HO, JU, KL, KR, ME, SS, WN, WU, 2, 3, 6, 8, 10, 21, 23.

'**Gouchaltii**'. Leaves variegated yellow and pink. WN, 6, 8.

'**Spaethii**'. Leaves with yellow margins. WN, WU.

Cornus amomum (5)

SILKY DOGWOOD

Strong-growing shrub to 7-8 ft. Pale blue berries in summer. Dark red twigs in winter. MU, 8, 10, 22.

Cornus racemosa (paniculata) (4)

GRAY DOGWOOD

To 10-12 ft. White berries on red stalks in early summer. As with other shrubby dogwoods, the clusters of small white flowers are not especially conspicuous. Most are good wild-life shrubs, appearing their best in naturalized parts of the garden. DU, EI, MU, WN, 3, 6, 8, 12, 18, 22.

Cornus sanguinea (4)

BLOOD-TWIG DOGWOOD

To about 8 ft. Black berries in autumn. Like most shrubby dogwoods, foliage turns red in autumn. WN, 3, 8, 11, 18.

Cornus sericea (stolonifera) (2)

RED OSIER DOGWOOD

Robust tall suckering shrub with white berries in summer and bright red winter twigs. Suited for moist spots. DU, EI, FO, JU, KE, ME, PA, SI, 6, 8, 11, 18, 21.

Selected form: '**Flaviramea**' ('**Lutea**'). Twigs bright yellow in winter. DU, EI, FO, JU, PA, WN, WU, 2, 6, 8, 10, 17, 22.

Hazelnut, Filbert

Corylus americana (4)

AMERICAN HAZELNUT

Shrub to 5 ft. or more. The edible nuts are usually smaller than those of *C. avellana*. An addition to wild-life plantings. DU, EA, EI, GU, KL, KR, MC, ME, PL, ST, WB, WN, 8, 11, 17, 18.

Corylus avellana (4)

EUROPEAN HAZELNUT

Tall spreading shrub to 15 ft. or more. Catkins attractive in late winter. Often cultivated for nuts. BU, CA, FI, KE, KL, MI, 6, 11, 29.

Selected form: '**Contorta**'. Shrub to 6-7 ft. with sharply twisted branches. An apt cat-

alog name is "Harry Lauder's Walking Stick." Not grown for its nuts. CL, D1, FX, G1, GR, KE, KL, KR, OL, SR, WG, WN, 5, 6, 10, 18, 22, 25, 26.

Corylus maxima 'Purpurea' (5)

PURPLE-LEAF FILBERT

Shrub to 10 ft. or more. Leaf color most intense in spring. Full sun. ME, 6, 8.

Smoke-bush

Cotinus coggygia (Rhus cotinus) (4)

Loosely branched shrub to 10-12 ft. with green leaves. Fluffy gray-to-purple fruiting panicles in summer. Since some plants may have entirely staminate ("male") flowers, it is wise to seek out cutting-grown plants with conspicuous fruit heads. Autumn color orange-to-yellow. CL, DA, FO, KE, MC, ME, OL, WN, 6, 8, 10, 26.

Selected form: 'Royal Purple'. Purplish leaves and fruit heads. BU, CL, FI, GR, KL, MC, ME, SS, WG, WN, 6, 8, 15, 21.

Cotoneaster

Cotoneaster acutifolius (5)

PEKING COTONEASTER

Tall upright shrub with dull green leaves 2-in. long. Black fruit. Many of the plants in the trade may be *C. lucidus*, which has lustrous foliage. FI, HO, JU, MC, ME, PL, VA, 6, 8, 14, 17, 18, 21, 23.

Cotoneaster divaricatus (5-4B)

SPREADING COTONEASTER

Shrub to 5-6 ft. with arching branches and glossy dark green leaves. Leaves small, rather closely set. Bright red berries in autumn. Probably the most refined cotoneaster of medium size. DA, KE, KL, KR, MC, ME, PL, SR, WB, WG, WN, WU, 6, 8, 14, 18, 20, 21, 22.

Cotoneaster franchettii (6-5B)

Shrub to 8 ft. with leaves retained late in autumn. Small orange-red berries. SR, WN, 13.

Cotoneaster integerrimus (5)

Rounded shrub to about 5 ft. Many short stiff twigs. Red berries. WU.

Cotoneaster salicifolius (6)

WILLOW-LEAF COTONEASTER

To 6 ft. or more; 3-in.-long glossy leaves held late in autumn. Nearly evergreen in the South. Red berries. DA, EI, KE, 16, 18, 22.

Selected form: Var. *floccosus*. Hardier than the species. CL, DA.

For other Cotoneasters see pages 36, 62.

Cyrilla

Cyrilla racemiflora (6)

Splendid southern shrub native from Virginia

to Florida (but hardy in the North); to 10 ft. or more. Attractive pendulous racemes of seed heads held long into autumn. Fiery fall color, especially pretty because the shiny green leaves do not turn completely red at one time. It needs a peaty soil which holds moisture. Fine for bonsai. LO, WX.

Elaeagnus

Elaeagnus angustifolia (3)

RUSSIAN-OLIVE. *See page 10.*

Elaeagnus multiflora (4)

CHERRY ELAEAGNUS

Large spreading shrub with inconspicuous but fragrant flowers in early May. Tart though edible red berries in early summer. LO, 8, 10, 18.

Elaeagnus pungens (7-6B)

THORNY ELAEAGNUS

Dense, broad and eventually tall evergreen shrub. Common in the South, but hardy in slightly protected sites as far north as Long Island. Intensely fragrant small flowers, especially valued for their appearance in October. LO.

Selected form: 'Fruitlandii'. Rounded leaves with wavy margins. WB, 12, 20, 30.

Elaeagnus umbellata (4-3B)

AUTUMN ELAEAGNUS

Tall spreading shrub with silvery-brown berries turning red in autumn. Young foliage silvery, later dark green. KR, ME, PA, SS, 3, 8, 10, 11, 12, 17, 18, 22.

Named form: 'Cardinal'. A strain developed for profuse fruit production. Useful in wild-life plantings but should be used with caution on small properties as it may become a weed. BU, CR, EI, FO, JU, KE, KL, MU, WG, WN, 6, 23.

Euonymus

Euonymus alata (3)

WINGED EUONYMUS

Shrub to 8 ft. with corky twigs. Brilliant rose-scarlet autumn color. Conspicuous fruit. BU, EI, FO, JU, KE, MC, VA, WG, WN, WU, 2, 6, 8, 10, 16, 17, 21, 22.

Selected form: 'Compacta'. Dense, to about 5 ft. Twigs not as corky. A fine hedge where scale insects are not bothersome. Memorable autumn color. CL, FO, G1, IT, KL, KR, ME, MU, PR, SR, ST, WG, WU, 2, 3, 6, 10, 11, 16, 21, 22.*

Euonymus europaea 'Aldenhamensis' (4-3B)

ALDENHAM SPINDLE-TREE

Shrub to 8 ft. or more with dark green leaves.

Abundant reddish-pink fruit in autumn. HO, WN.

'Red Cascade' is similar. GO, WG, WU.

Euonymus fortunei Emerald Series (5)

Several cultivars selected for uniform growth habit and good green or variegated foliage. Evergreen or nearly so in the northern reaches. CR, FI, KE, KR, OL, SR, SS, WN, WU, 3, 5, 6, 10, 20, 23.*

Euonymus japonica (7-6B)

JAPANESE EUONYMUS

Upright evergreen shrub to 8-10 ft. Fresh dark green leaves. Often used for hedges in mild climates. Japanese euonymus and forms: KE, ME, PA, 3, 16, 20, 30.

Euonymus kiautschovia (patens) (6-5B)

SPREADING EUONYMUS

Rather loose half-evergreen shrub to 6 ft. Shiny dark green leaves give the appearance of being evergreen in summer. DA, MU, 3, 18, 22.

Selected form: 'Manhattan'. EI, FI, ME, WB, WG, WN, 2, 3, 11, 12, 16, 18, 20.

Euonymus yedoensis (4)

YEDDO EUONYMUS

Large spreading shrub with pink fruit and brilliant red autumn color. EI.

For other Euonymus see page 64.

Sea-buckthorn

Hippophae rhamnoides (2)

Open shrub to about 12 ft. with silvery leaves. Bright orange berries retained into winter. Dioecious. VA, WG, 6.

Holly

Ilex altaclarensis 'Wilsonii' (aquifolium x perado) (6B)

Vigorous, eventually large shrub. Large evergreen leaves, usually with even toothing. Foliage not as lustrous as in English holly. Pistillate. 20.

'James C. Esson' is similar. 20.

Ilex aquifolium

ENGLISH HOLLY. *See page 17.*

Ilex aquipernyi (aquifolium x pernyi) (6B)

Evergreen shrub to 12 ft. or more in the South, much less in the North. Twisted small spiny leaves. This and similar evergreen hollies benefit from winter shade on Long Island. DA, KE, SS.

Selected form: 'San Jose'. Fine glossy foliage and abundant red fruit. One of the best hollies. SS, WN, 1, 3, 7, 20.

Ilex cassine (7)

DAHOON

Evergreen shrub to 10 ft. or more. Abundant

red berries. Leaves spineless. An attractive shrub especially suitable for moist soils. SA, WX.

Ilex ciliospinosa (6B)

Upright evergreen shrub to 8 ft. or more. Spiny leaves 1-1½ in. long. Bright red berries. WN.

Ilex cornuta (6)

CHINESE HOLLY

Evergreen shrub to 6 ft. or more. Glossy leaves with 3-pointed tips. Red berries produced on pistillate plants without pollination, but for best fruit production it may be advisable to also plant staminate plants. KE, 12, 20.

Selected forms: 'Burfordii'. BURFORD HOLLY. Leaves usually spineless, short-tipped. Pistillate. CL, DA, EA, GI, KE, ME, 1, 3, 12, 16, 18, 20, 30.

'Burfordii Nana'. Similar to the preceding, but to 3-4 ft. CL, KE, ME, 1, 12, 13, 16, 20, 30.

'Rotunda'. Compact, slow-growing form with somewhat rounded spineless leaves. Pistillate. KE, ME, 1, 12, 13, 16, 20, 30.

Ilex crenata (5)

JAPANESE HOLLY

Dense evergreen shrub to 15 ft. or more. Leaves usually about 1-in. long, but variable. Inconspicuous black berries. Some forms are among the finest broad-leaf evergreens planted in the North. Moderately shade-tolerant. Small-leaf forms make good bonsai subjects. DU, KE, PA, 10, 18.

Selected forms: 'Compacta'. CL, KE, SR, WB, WN, 3, 10, 12, 13, 16, 20, 25, 30.

'Convexa' ('Bullata'). BOX-LEAF HOLLY. Dense, to 6-ft., with small convex leaves. Fine hedge. BR, CR, GI, KE, MU, WA, WN, WU, 1, 3, 8, 12, 13, 16, 18, 22, 25.

'Microphylla'. Dense upright shrub to 6 ft. Fairly small leaves. KE, SR, WB, 13, 18, 29, 30.

'Rotundifolia'. To 5-6 ft. Comparatively wide short leaves. KE, ME, MU, WB, 3, 10, 11, 12, 13, 16, 30.

For other Japanese Hollies see page 65.

Ilex 'Edward Stevens' (aquifolium x cornuta) (6)
Horticultural husband of 'Nellie Stevens', (see below). CL.

Ilex glabra (4)

INKBERRY

Loose evergreen shrub to 6 ft. or more. Shiny dark green leaves about 1-in. long, not spiny. Suited to moist soils. EI, HO, KE, SS, WN, 1, 10, 16, 18, 22.

Selected forms: 'Compacta'. Dense, to 4-5 ft. DU, FX, GI, ME, OL, PA, WN, 2, 3, 7, 8, 10, 12, 14, 16, 18, 22, 29.

'Ivory Queen'. Berries white. BO, KE.

Ilex meserveae (rugosa x aquifolium) (5B)

Evergreen, eventually to 7 ft., with attractive small spiny leaves that are lustrous. Cultivars include 'Blue Prince', 'Blue Princess', 'Blue Angel', 'Blue Boy', and 'Blue Girl'. CL, CR, RE, ME, MU, OL, PA, SR, WG, WN, WO, 1, 3, 4, 5, 6, 7, 20, 23, 25.*

Ilex 'Nellie Stevens' (aquifolium x cornuta) (6)

Evergreen shrub to 8 ft. or more. Red berries produced without pollination, but more abundant fruit occurs when grown near staminate plants of English holly or 'Edward Stevens', (see above). CL, DA, GI, KE, WB, WN, 1, 3, 12, 13, 16, 18, 30.

Ilex opaca (5-4B)

AMERICAN HOLLY. See page 17.

Ilex pedunculosa (6-5B)

Evergreen shrub or small tree to 10 ft. or more. Leaves spineless, similar to mountain-laurel. Pistillate plants have red berries on long stalks, and, as with most hollies, staminate plants are needed for fruit set. DA, KE, OL, PR, WN, 1, 7, 18, 25.

Ilex pernyi (6)

Evergreen shrub to 10 ft. or more. Pyramidal in youth. Very small, squat, spiny leaves. Clusters of red berries. AL, DA, KE, WN, 7.

Ilex serrata (5-4B)

JAPANESE WINTERBERRY

Similar to *I. verticillata*, but with smaller red berries abundantly borne. Bonsai candidate. AL, DA, WN, WT, 24.

Ilex verticillata (3)

WINTERBERRY (BLACK-ALDER HOLLY)

Open deciduous shrub to 7 ft. or more. Bright red berries sometimes retained far into winter. Variable. Tolerant of moist soils. DU, EI, FO, HO, KE, KR, OL, PA, SS, WN, 1, 8, 10, 18, 22.

Named forms: CL, FX, OL, SR, WG, 1, 7, 17, 24, 25.

Ilex vomitoria (7)

YAUPO

Tall evergreen shrub or small tree. Red berries prolifically borne on pistillate plants. Drought-resistant. Occasionally used for clipped hedges. SA.

Selected form: 'Nana'. 13, 20, 30.

Sweet Bay, Laurel

Laurus nobilis (6B)

Tall shrub with aromatic evergreen leaves, 3-4 in. long. Shears well and is sometimes grown as a tub plant. Dies back to the ground in New York City each winter but is root-hardy if mulched. KE, WX.

Privet

Ligustrum amurense (4-3B)

AMUR PRIVET

Pyramidal shrub to 10 ft. or more. Widely used as a hedge in northern areas where the similar California privet is not reliably hardy. All of the common privets are tolerant of a wide range of growing conditions. BU, FI, IT, JU, KL, KR, MC, ME, MI, MU, PL, ST, WN, WU, 6, 11, 18, 21, 22.*

Ligustrum ibolium (ovalifolium x obtusifolium) (4)

Vigorous upright shrub much like California privet but hardier. CR, EI, ME, WN, 6, 11, 18, 22.

Ligustrum japonicum (7)

JAPANESE PRIVET

Evergreen shrub to 8 ft. or more. Lustrous 4-in.-long deep green leaves with dark red margins. This and the similar *L. lucidum* are probably the finest privets, but they are tender in many parts of the country. 20.

Selected form: 'Rotundifolium' ('Coriaceum').

ROUND-LEAF PRIVET. Slow-growing to about 6 ft. Thick coinlike leaves. DB, FX, LO, 19, 30.

Ligustrum lucidum (7)

GLOSSY PRIVET

Evergreen shrub to 10 ft. or more, sometimes a small tree. Shiny leaves up to 6-in. long. DA, WB, 12, 13, 16.

Ligustrum ovalifolium (5)

CALIFORNIA PRIVET

Familiar hedge shrub to 10 ft. or more. Shiny leaves sometimes persist into winter. A native of Japan despite the common name. North of New York City, Amur privet is more reliably hardy. Like most privets, it is tolerant of poor soil and shade. CL, DA, KE, MU, WB, 3, 10, 11, 16, 18, 22.

For other Privets, see page 66.

Spice-bush

Lindera benzoin (Benzoin aestivale) (4)

Aromatic shrub to 8 ft. or more. Small yellow flowers in early spring. Useful for moist soils and naturalized areas. DU, EI, FO, GA, LO, ME, WN, WX, 8, 22.

Honeysuckle

Lonicera maackii (2)

AMUR HONEYSUCKLE

Very large, often with spreading branches. Valued for long-lasting red fruits in autumn, an attraction to wild-life. A prolific seeder. White flowers fading to yellow, early summer. DU, KE, MU, VA, WN, WU, 8.

For other Honeysuckles, see pages 39, 66.

Mahonia

Mahonia bealei (6)

LEATHER-LEAF MAHONIA

Stiff evergreen shrub to 6 ft. or more. Coarse bluish-green compound leaves. Attractive small yellow flowers and conspicuous grape-like berries. Useful for foliage contrast. Shade. CL, DA, FX, LO, PA, WG, WN, 12, 13, 16, 20, 22, 30.

Mahonia pinnata (6)

Similar to *M. aquifolium* (see page 67), but eventually to 8 ft. or more. Duller, usually more numerous evergreen leaflets. Pale yellow flowers in clustered racemes. S1, 11.

Bayberry

Myrica cerifera (6-5B)

WAX-MYRTLE

Evergreen shrub to 8 ft. or more; 2-3 in.-long aromatic leaves. Berries silvery gray. Dioecious. CL, LO, ME, SA, WX, 8, 12, 13, 16.

Myrica pensylvanica (2)

NORTHERN BAYBERRY

Similar to the preceding, but deciduous and much hardier. Thrives in sandy soil. CL, DA, DU, EI, FO, HR, KE, ME, OL, PA, WG, WN, 3, 6, 8, 10, 14, 16, 22.

Heavenly-bamboo

Nandina domestica (7)

Stiffly upright shrub to 6-8 ft. with large clusters of bright red berries in autumn. Brilliant scarlet autumn color. Leaves retained through the year. BR, DA, EA, HR, KE, ME, WB, 11, 12, 13, 16, 20, 26, 30.

Selected form: 'Compacta'. To 3-4 ft. CL, KE, PO, 19, 20, 26.

Other forms: FX, HR, LO, WG, 30.

Osmanthus

Osmanthus fortunei (heterophyllus x fragrans) (7)

Vigorous evergreen shrub to 8 ft. or more. Small fragrant flowers in late spring; 3-4 in.-long holly-like leaves. 12, 13.

Osmanthus heterophyllus (ilicifolius) (6)

HOLLY OSMANTHUS

Tall dense evergreen shrub with leaves remarkably similar to English holly, but arranged in pairs along the stem. Fragrant small flowers in late summer. KE, WB, 12, 13. *Selected forms:* 'Gulf Tide'. Slow-growing, compact. CL, DA, ME, WB, 13, 15, 16, 20.

'Rotundifolius'. Twisted, somewhat rounded, nearly spineless leaves. Slow-growing, perhaps to 4 ft. or more. DA, 20.

Variegated-leaf forms: DA, DB, ME, 19, 20.

Mock-orange

Philadelphus coronarius 'Aureus' (4)

GOLDEN MOCK-ORANGE

To 5-6 ft., with leaves golden-yellow in spring. Full sun. HO, JU, KE, KL, KR, WU, 6, 17, 21.

For other Philadelphus see page 40.

Photinia

Photinia fraseri (7)

FRASER PHOTINIA

Vigorous tall evergreen shrub with reddish new growth through the summer. Large shiny leaves and attractive white flowers. Hybrid origin: *P. glabra* x *serrulata*. The form available is a cultivar, 'Birmingham', but it is known in the trade simply as Fraser photinia. Tips of shoots suffer winter injury in New York City, but these may be easily pruned out in early spring. First-rate. KE, ME, 12, 13, 15, 16, 20, 26, 30.

Photinia glabra (7)

JAPANESE PHOTINIA

Handsome evergreen shrub to 7-8 ft. with shiny leaves 3-4 in. long; 4-in.-wide flower clusters in mid-spring. Red berries in autumn. ME, 12, 15, 26.

Photinia villosa (5-4B)

ORIENTAL PHOTINIA

Spreading deciduous shrub to 8-10 ft. with generally good red or orange-yellow autumn color and persistent red berries. Moderately attractive white flowers in mid-May. 8.

Eastern Ninebark

Physocarpus opulifolius (3-2B)

Vigorous shrub to 8 ft. or more with small maple-like leaves. Leggy. Conspicuous clusters of small white flowers in late May, followed by decorative red seed pods. Peeling bark. 8, 11.

Selected forms: 'Luteus' ('Aureus'). GOLDEN NINEBARK. Leaves bright yellow in spring. Full sun. MC, ME, WN, WU, 6, 8, 11, 21.

'Nanus'. DWARF NINEBARK. Dense, to 4-5 ft. More refined than the species. ME, VA, 6, 8, 11, 21.

Trifoliate-orange

Poncirus (Citrus) trifoliata (6-5B)

Handsome, dense, thorny shrub with green twigs in youth; small open tree with picturesque smooth brown bark at maturity. Small waxy leaves. Two-inch-wide white flowers in April. Small oranges, first cousins to the true orange, are colorful in autumn, but suitable



Heavenly-bamboo (*Nandina domestica*) has excellent autumn foliage and fruit.

only for marmalade. Minor twig damage occurs in Long Island in a severe winter. A satisfactory hedge southwards. DU, SA, 12.

Cherry, Cherry-laurel, Plum

***Prunus cistena* (2)**

PURPLE-LEAF SAND CHERRY

Shrub to 6-7 ft. with purplish-red leaves. Small white flowers in early May. Purplish-black fruit. CR, EI, FI, FO, GI, HO, IT, JU, KE, ME, OL, WN, WU, 2, 6, 17, 18, 23, 26.

***Prunus laurocerasus* (6)**

CHERRY-LAUREL

Shrub to about 10 ft. with lustrous evergreen leaves. Racemes of white flowers in mid-May. KE, WX, 20, 26.

Selected forms: 'Otto Luyken'. To about 3 ft.; twice as broad. CL, DB, KE, ME, 16, 19, 20, 26.

'Schipkaensis'. (5-4B). Dense, to 5 ft. or more, usually broader than tall. Five-in.-long shiny leaves. DA, PA, WB, 12, 16, 26.

'Zabeliana'. Small leaves. 11, 19, 20, 26.

***Prunus maritima* (3)**

BEACH PLUM

Spreading shrub to 6 ft. with handsome white flowers in late April. Small edible plums in late summer. Satisfactory under in-

land as well as coastal conditions. CR, FO, KE, KL, WN, 8, 10, 18, 22, 25.

For other **Prunus** see pages 14, 32, 40, 68.

Firethorn, Pyracantha

***Pyracantha atlantioides* 'Aurea' (6)**

GIBBS YELLOW FIRETHORN

Similar to *P. coccinea* forms, but taller. Birds ignore the yellow berries which remain attractive until late autumn. Half-evergreen. 16.

***Pyracantha coccinea* (6)**

SCARLET FIRETHORN

Strong-growing, semi-evergreen shrub to 8 ft. or more. Attractive small white flower clusters in late May or early June. Numerous red or reddish-orange berries in autumn. Birds quickly devour the ripened berries of some firethorns while ignoring others. Evergreen southwards. Frequently espaliered. Beginner's bonsai. The species is usually sold in its forms. *Selected forms:* 'Kasan'. Hardy in Zone 5. Fruits orange-red. BU, FI, HO, IT, KE, PL, 6, 20, 23.

'Lalandei'. More-or-less hardy in Zone 5. Vigorous, almost rank grower to 8-10 ft. Fruits scarlet-red. CL, DA, KL, ME, OL, SR, SS, WB, WN, 3, 6, 10, 12, 13, 16, 18, 22, 29, 30.*



Pyracantha bears abundant yellow, orange or red berries. Most will attract birds, but 'Mohave' doesn't and fruits persist.

'Lowboy'. To 3-5 ft. ME, 3, 12, 16, 18, 20, 22, 29.

'Rutgers'. To 3 ft. tall, 9 ft. wide. Resistant to fireblight and scab. WG, 22.

***Pyracantha* 'Mohave' (*koidzumii* x *coccinea*) (6)**

Upright evergreen or semi-evergreen shrub to about 8 ft. Resistant to fireblight and scab. Persistent orange-red fruits spurned by birds. CL, GI, KE, ME, OL, WB, WG, 2, 3, 4, 7, 10, 12, 16, 19, 20, 22, 23, 29, 30.

Other Pyracantha species and forms: CL, DA, HR, LO, ME, 2, 3, 16, 19, 20, 22, 30.

Buckthorn

***Rhamnus cathartica* (3)**

COMMON BUCKTHORN

Vigorous shrub to 10-12 ft., often a small tree at maturity. Lustrous foliage. Although not a first-rate ornamental, buckthorn may be useful in conservation plantings because of

its black berries, a source of wild-life food. 8.

Rhamnus frangula 'Asplenifolia' ('Laciniata') (3?)

FERN-LEAF BUCKTHORN

Shrub to 6 ft. or more with deeply cut, linear foliage, Graceful novelty. GI, 17.

Rhamnus frangula 'Columnaris' (3)

TALL-HEDGE BUCKTHORN

Vigorous narrow columnar shrub to 12 ft. or more, useful for hedges. Shiny green leaves. BU, EI, GU, HO, JU, KL, KR, KS, WG, WN, 8, 10, 17, 18, 21, 22.

Sumac

Rhus aromatica. See page 69.

Rhus copallina (5-4B)

SHINING SUMAC

Tall shrub or small tree with lustrous deep green leaves with winged midribs. Scarlet autumn color and crimson fruits. Less coarse than the following two species. EA, ME, 11, 18.

Rhus glabra (3)

SMOOTH SUMAC

Shrub to 8-10 ft. with leaves bright red in autumn. Fruits scarlet. FO, MU, SA, VA, 8, 11, 12, 18, 21, 22.

Rhus typhina (3-2B)

STAGHORN SUMAC

Sparsely branched open shrub or a small tree to 10 ft. or more. Velvety twigs. Clump-forming, like the preceding two. Brilliant orange-scarlet autumn color. Seeds eaten by wild-life. FO, GA, ME, MU, SR, VA, 6, 8, 11, 12, 21, 22, 26.

Selected form: 'Laciniata'. CUT-LEAF SUMAC. Very graceful. JU, PL, SR, WG, WN, 6, 8, 15, 21.

Alpine Currant

Ribes alpinum (3-2B)

Compact shrub to 5-6 ft. with refined small maple-like leaves. Useful for hedges in cold climates. Many currants serve as alternate hosts for white pine blister rust and should not be planted where 5-needle pines are common. The staminate form of *R. alpinum* is reportedly immune. EI, HO, JU, KE, ME, VA, WU, 6, 8, 17, 23.

For other Currants see page 43.

Willow

Salix purpurea (4-3B)

PURPLE OSIER

Spreading shrub to 10 ft. or more. Purplish twigs. Leaves bluish beneath. WN.

Salix sachalinensis 'Sekka' (4)

FAN-TAIL WILLOW

Spreading tall shrub with twisted and often flattened (fasciated) twigs. An occasional

hard pruning encourages twig character. Useful in winter floral arrangements. A curiosity. FO, FX, ME, WN.

For other Willows see pages 15, 46, 70.

Elder

Sambucus canadensis (3)

AMERICAN ELDER

Loose vigorous suckering shrub to 10-12 ft., with coarse compound leaves. Showy flat cymes of white flowers in early summer, followed by edible purplish-black berries. Mainly for wet sites or for wild-life plantings. DU, EA, FI, GU, JU, KL, KR, ME, MI, ST, WN, 6, 8.

Selected forms: 'Acutiloba'. Cut-leaved. 8.

'Aurea'. Yellow leaves. AE, FI, WN, 6, 8, 21.

Buffalo-berry

Shepherdia argentea (3-2B)

Tall spiny shrub with silvery leaves and twigs. Edible scarlet berries in late summer. Dioecious. Tolerant of poor, dry soil and sometimes used as a hedge in colder areas. FO, GU, ME, VA, 6, 8.

Shepherdia canadensis (2)

RUSSET BUFFALO-BERRY

Thornless open-branched shrub to 5-6 ft. with gray-green leaves. Sweet yellowish-red berries in early summer. Dioecious. Tolerant of dry and alkaline soils. VA, 8.

Snowberry

Symphoricarpos chenaultii (microphyllus x orbiculatus) (5)

CHENAULT CORALBERRY

Suckering shrub to 3-4 ft. with small leaves. Small red berries, whitish beneath. Useful as a bank cover or in a wild-life planting. DA, DU, GI, KL, WN, 6, 8, 22.

Selected form: 'Hancock'. Dwarf spreading shrub suitable for a rough ground cover on dry banks. BO, DU, FO, MC, WU, 6, 22.

Symphoricarpos 'Mother of Pearl' (4?)

To 4-5 ft. Large light pink berries. A hybrid of snowberry and coralberry. WN.

Symphoricarpos orbiculatus (vulgaris) (3)

INDIAN CURRANT, CORALBERRY

Similar to *S. chenaultii*. Berries purplish-red, smaller. Suckering. Bank cover. DU, EI, FO, ME, WU, 6, 8, 12, 18, 22.

Symphoricarpos rivularis (albus laevigatus) (3)

SNOWBERRY

Shrub to 5-6 ft. with attractive ½-in.-wide white berries in late summer and autumn. Suckering. Flowers not showy. Invariably sold as *S. albus*. DA, DU, EI, FO, GI, KL, ME, WN, WU, 6, 8, 14, 17, 22.

Asiatic Sweetleaf

Symplocos paniculata (5)

Tall shrub or small tree with small clusters of fragrant white flowers in mid-May. Hand-some sapphire-blue berries in early autumn which unfortunately do not last long. DA, FO.

Blueberry

Vaccinium ashei (7)

RABBIT-EYE BLUEBERRY

Medium to large shrub grown in the South for edible fruit. A number of selections have been made. Scarlet autumn leaf color, occasionally evergreen. More satisfactory in warm climates than *V. corymbosum*. BU, EA, FI, GU, LO, ST.

Vaccinium corymbosum (4-3B)

HIGHBUSH BLUEBERRY

Dense twiggy shrub growing slowly to 8 ft. Dainty heathlike white flowers in May. Orange-scarlet autumn color. Acid soil. Many forms cultivated for fruit. BU, CL, DA, FI, GA, GU, KE, KL, KR, ME, MI, WN, 10, 18, 20, 22, 25.*

Viburnum

Viburnum acerifolium (3)

MAPLE-LEAF VIBURNUM

Loose shrub to 4-5 ft. Crimson autumn color and black berries. For a shady spot in the naturalized garden. Except for snowball forms, most viburnums are good wild-life shrubs because of their berries. They generally have good dark red autumn foliage. KE, 10.

Viburnum alnifolium (3)

HOBBLE-BUSH VIBURNUM

Broad suckering shrub to 8 ft. or more. Large rounded leaves. Flat white flower clusters surrounded by conspicuous sterile florets in early spring. Berries red, finally black. Useful in moist parts of a northern woodland garden. GA.

Viburnum cassinoides (2)

WITHE-ROD VIBURNUM

Shrub to 6 ft. with clusters of white flowers in late May. Berries changing from yellow to red and black. Good in a naturalized garden. As with other shrubs, best fruit production is likely to occur when several plants of the same species are planted together. FO, GA, WN, 10, 18.

Viburnum dentatum (3-2B)

ARROW-WOOD VIBURNUM

Leggy shrub to 10 ft. or more. Glossy roughly cut leaves. Conspicuous flat clusters of white flowers in late May. Blue-black berries in autumn. Shade-tolerant. EI, JU, KE, ME,

PA, WN, WU, 2, 3, 6, 10, 11, 14, 15, 18, 21, 22.*

Viburnum dilatatum (5)

LINDEN VIBURNUM

Dense shrub to 5-6 ft. Notable for its clusters of red berries that last into winter. One of the most fruitful viburnums, but rather variable. CL, DA, HO, KE, WN, WT, 3, 10, 18, 22.

Viburnum japonicum (7)

Evergreen shrub to about 5 ft. Glossy dark green leaves sometimes 6-in. long. Fragrant white flowers in spring. Bright red berries. 20, 30.

Viburnum lantana (4-3B)

WAYFARING-TREE

Tall open shrub with somewhat coarse foliage. Clusters of white flowers in early May. Berries change from red to black. EI, FO, HO, KE, KR, PL, SS, VA, WU, 6, 8, 10, 11, 14, 18, 21, 22, 23.

Viburnum lentago (3-2B)

NANNY-BERRY

Vigorous tall spreading shrub with clusters of white flowers in mid-May. Berries change from red to black in autumn. Useful in a naturalized area. DA, HO, PL, VA, WU, 2, 6, 8, 10, 12, 14, 15, 17, 18, 22, 23.

Viburnum opulus (3)

EUROPEAN CRANBERRY-BUSH

Stout open-growing viburnum to 8 ft. or more. Flat clusters of small white fertile flowers, surrounded by conspicuous sterile florets, mid-May. Red berries often retained late in the season. Plant lice frequently disfigure the leaves of this species. EI, HO, KE, KL, ME, PL, WU, 3, 6, 10, 14, 16, 21, 22.

Selected forms: 'Compactum'. Dense, to 5 ft. or more. A fruiting form, not to be confused with 'Nanum' (see page 71). CL, HO, JU, KE, SS, VA, WG, 17, 23.

'Xanthocarpum'. Berries yellow. 15, 17.

Viburnum prunifolium (4)

BLACK-HAW VIBURNUM

Shrub to 10-12 ft. or small rounded tree. Small leathery leaves with deep purple or red autumn color. Berries turn from yellow to black. One of the best tall viburnums. DU, EI, FO, HO, KE, WG, WN, 3, 8, 14, 16, 17, 18, 22, 23.

Viburnum rhytidophyloides 'Willowood' (lantana x rhytidophyllum) (5)

Large dense shrub with rough, long leaves held late in autumn. Flat clusters of white flowers in spring, again in autumn. ME, WN, 11, 21, 23, 25.

Viburnum rhytidophyllum (6-5B)

LEATHER-LEAF VIBURNUM

Broad dense evergreen shrub to 6 ft. or



Orange-fruited tea viburnum (*V. setigerum* 'Aurantiacum') is unique in its fruit color and makes a spectacular autumn sight.

more. Long rough leaves. White flower clusters in late spring. Foliage retained in best condition Philadelphia southwards. DA, DB, EI, HO, WB, WN, 3, 10, 11, 12, 16, 18, 22, 26.

Viburnum setigerum (theiferum) (5)

TEA VIBURNUM

Long-stemmed shrub to 8 ft. or more. Profuse red berries in autumn. DA, EI, KE, ME, SS, WT, 3, 8, 10, 12, 16, 18, 22.

Selected form: 'Aurantiacum'. Orange berries. HO, WN.

Viburnum tinus (8-7)

LAURESTINE

Dense evergreen shrub to 10 ft. or more. Glossy dark leaves. Pinkish-white flowers in late winter or early spring. Makes a handsome hedge.

Selected forms: 'Compactum'. 20, 26.

'Robustum'. 20, 26.

Viburnum trilobum (americanum) (3-2B)

AMERICAN Highbush-CRANBERRY

Sometimes considered a botanical variety of *V. opulus*, which it closely resembles. Fruits edible. Useful in a wild-life planting. BU, FO, JU, KR, ME, PA, SR, WN, WU, 6, 10, 14, 17, 18, 21, 23.

Viburnum wrightii (5)

WRIGHT VIBURNUM

Rather refined shrub to 6 ft. or more. Numerous red berries in autumn. A form of *V. dilatatum* with very pubescent leaves is

sometimes sold as *V. wrightii*, but the latter species has nearly glabrous leaves. CL, PA, SR, SS, WN, 2, 3, 8, 10, 14.

For other Viburnum see pages 47, 71.

Weigela

Weigela 'Foliis Purpuriis' ('Java Red', 'Purpurea') (5)

PURPLE-LEAF WEIGELA

Shrub to 4 ft. with dull purplish-green leaves. Pink flowers in spring. CR, DB, ME, SR, 2, 3, 8, 18, 20.

Weigela 'Nana Variegata' (5)

To about 3 ft. Variegated foliage. Needs little pruning. ME, WN, 2, 6, 8, 10, 11, 20.

Weigela 'Variegata' (5)

To about 4 ft. Golden variegated leaves. Flowers deep rose. GI, KE, KL, SR, SS, 17, 18, 21.

For other Weigela see page 48.

Prickly-ash

Zanthoxylum simulans (6)

FLATSPINE PRICKLY-ASH

Shrub to 10 ft. or more, often a small tree. Knobby protrusions on older bark form flattened spines. Refined, small compound leaves. Ruddy red fruits in autumn release aromatic, shiny black seeds, used in Chinese cooking as pepper. Useful for wildlife. WX.

DWARF OR LOW-GROWING SHRUBS

Deciduous and Broadleaf-evergreen

(Deciduous unless otherwise noted)

Those marked “” also available at most nurseries.*

Abelia

Abelia ‘Edward Goucher’ (grandiflora x schumannii) (7-6B)

Mounded shrub to 2-3 ft. Small trumpet-shaped flowers in summer. Magenta. Leaves retained late in autumn in New York. BR, DA, KE, LO, ME, 13, 16, 19, 20.

Abelia grandiflora (chinensis x uniflora) (6-5B)

GLOSSY ABELIA

Mounded shrub to 3-4 ft. in the North, twice that in the South. Refined, small leaves retained late into autumn. Attractive, although not showy, white-to-pink flowers through summer. Has the longest flowering season of any shrub hardy in New York. CL, EI, KE, ME, ST, WB, 2, 3, 10, 11, 12, 13, 18, 19, 20, 22, 30.*

Selected forms: ‘Frances Mason’. Golden-variegated foliage. LO, ME, SR, 7, 19, 20.

‘Nana’ (‘Prostrata’). To 2 ft. Nearly prostrate. Ground cover. 2, 20.

U.S.D.A. #210092. Rose-pink flowers. CL, CU.

Abelia schumannii (7)

Mounded shrub to 3-4 ft. with semi-evergreen leaves. Lavender-pink flowers in summer. AL, WB.

Abelia-leaf

Abeliophyllum distichum (5-4B)

Dense shrub to 3-4 ft. with white forsythia-like flowers in early April. Flower buds may be susceptible to late frosts in cold areas. Slow-growing. Sometimes difficult to establish. CL, DA, DB, ME, WT, WU.

Adina

Adina rubella (7)

Tidy shrub to 4 ft. with glossy small leaves and, in summer, little globes of white flowers, much resembling a refined *Cephalanthus*. WX.

Andromeda, Bog-rosemary

Andromeda glaucophylla (2)

DOWNY ANDROMEDA

Shrublet to 6-8 in. with stiff, twiggy stems. Bluish evergreen leaves. Light pink flowers in May. Needs moist, acid soil. DB, SR, WN, 7.

Andromeda polifolia ‘Nana’ (2)

DWARF BOG-ROSEMARY

Dense mound to 10-12 in. with narrow gray-green evergreen leaves. Attractive pink flowers in May. AL, BO, CU, DB, FO, GR, HE, HR, KE, ME, OL, SK, WN, 7, 19.

Bear-berry

Arctostaphylos uva-ursi (2)

Dense trailing ground cover to 1 ft. Small dark evergreen leaves. Tiny white flowers in May. Red berries. Needs acid, sandy soil. AL, BR, CR, CU, DB, FO, KE, LA, ME, OL, SR, WN, 6, 7, 15, 19, 26.

Barberry

Berberis darwinii (7)

DARWIN BARBERRY

Handsome evergreen shrub generally growing to only 3 ft. in the U.S. Leaves small, holly-like, turning purple in autumn. Rather conspicuous orange-to-yellow flowers in early spring. 19.

Berberis stenophylla ‘Corallina Compacta’ (darwinii x empetrifolia) (5)

ROSEMARY BARBERRY FORM

Compact evergreen or persistent-leaved shrub to 10 in. with small slender leaves. Yellow flowers in spring. HR, SK.

Similar forms: GR, ME, 19.

Berberis thunbergii ‘Crimson Pygmy’ (‘Atropurpurea Nana’) (5-4B)

CRIMSON PYGMY BARBERRY

Handsome compact shrub to 2 ft. with dark red leaves. Broader than tall. Good low hedge. BR, CL, FI, FO, KE, KL, KR, LA, MC, SR, 2, 4, 5, 7, 10, 19, 20, 30.*

Berberis triacanthophora (5)

THREE-SPINE BARBERRY

Handsome evergreen shrub to 3-4 ft. Slender 2-in.-long leaves. KE, 18, 22.

Berberis verruculosa (6-5B)

WARTY BARBERRY

Mounded evergreen shrub to 3-4 ft. Lustrous leaves, white beneath, are 1-in. long. Most barberries have graceful small yellow flowers in spring, but the flowers of this species are especially nice. DA, KE, PA, WB, WN, 10.

For other **Barberries** see page 49.

Dwarf Birch**Betula nana (2)**

Low, spreading, twiggy shrub to 2 ft. Leaves small, often rounded. Deciduous. LA, BY, DB, FO, GR, SK, 19.

Spike-heath**Bruckenthalia spiculifolia (5)**

Spreading evergreen shrublet to 10-12 in. Pale pink flower spikes in May-June. Heather relative, with the same cultural requirements. CU, KE, WN, WO, 7.

Boxwood**Buxus 'Green Gem' (microphylla x sempervirens) (5)**

Fairly tight globe to 2 ft. Small green leaves. WG, WN.

Buxus microphylla 'Compacta' (5)

KINGSVILLE DWARF BOX

Exceptionally dense, slow-growing shrub to about 18 in. Small leaves. Bonsai candidate. BO, BY, CU, DB, DI, FX, GR, HR, KE, OL, PA, SK, SR, 7, 19, 28, 29. 'Morris Midget' is slightly larger and less dense. BO, FO, GR, HR, 19.

Buxus microphylla koreana (4)

KOREAN BOX

Spreading somewhat loose evergreen shrub to 1½ or 2 ft. tall. Winter foliage not as attractive as in *B. sempervirens*. DA, EI, FI, GI, HR, KE, ME, MU, PL, ST, WA, WU, 3, 6, 13, 18, 19, 29.

Other forms: Var. *japonica* (6-5B). JAPANESE BOX. Compact evergreen shrub to 5 ft. with spreading branches and slightly larger leaves than in the species. HR, OL, SR, WN, 20, 30. **Tide Hill**. DB, DI.

'Wintergreen'. KE, WN, 4, 13, 17, 23, 29.

Buxus sempervirens 'Suffruticosa' (5)

EDGING BOX

Small-leaved dense evergreen shrub to 2-2½ ft. Often used as a miniature clipped hedge or edging plant. DA, KE, ME, SR, WB, WN, 4, 10, 16, 18, 19, 26.

Buxus sempervirens 'Welleri' (5)

COMMON BOX, WELLER FORM

Dense evergreen mound to 4 ft. after many years. Broader than tall at maturity. Foliage

attractive through winter. More satisfactory in the North than other forms of common box. CR, ME, 2.

Another hardy form: 'Vardar Valley'. DA, OL, WN, 2.

For other **Boxwood** see page 50.

Heather**Calluna vulgaris (4)**

Valuable small rock garden shrubs with small evergreen leaves and flowers ranging from white to pink and purple. Long flowering period, beginning in July. Although there is only one species, it is highly variable. Usually less than 1 ft. in gardens. Best results in acid soil of modest fertility. Soil should retain moisture but be well-drained. Full sun. Provide loose cover of evergreen boughs for winter protection from Philadelphia northwards. Substantial pruning, if needed, should be restricted to early spring.

Many named forms: AL, BY, CL, CU, DB, FO, FX, KE, ME, SR, WG, WN, WO, 7, 19, 25, 26.

Bluebeard**Caryopteris clandonensis 'Blue Mist' (incana x mongholica) (5)**

Shrub to 4 ft. with light blue flowers in late summer. Prune back to the ground in early spring. CR, JU, KL, LA, SS, WN, WO, 6, 10, 21.

Other form: 'Dark Knight'. Flowers purple. CL, LA, 2.

Cassiope**Cassiope lycopodioides (2)**

Evergreen mat to 6-8 in. Leaves scale-like. A heather relative with white bellshaped flowers in April. Moist, acid soil. BO, KE.

Dwarf Leatherleaf**Chamaedaphne calyculata var. nana (2)**

Evergreen to 18 in. with fairly dense spreading habit. Small white urn-shaped flowers are borne on racemes in early and mid-spring. Acid soil. Moisture tolerant. CU, DB.

Sweet-fern**Comptonia peregrina (2)**

Woody plant, to 3 ft., with aromatic fern-like foliage. Flowers inconspicuous. Good for dry banks. Should be cut back sharply when transplanted. DB, FO, GA, 18.

Dogwood**Cornus florida 'Pygmy' (5?)**

DWARF FLOWERING DOGWOOD



The well-named rock spray cotoneaster (*C. horizontalis*) has excellent autumn leaf color and red berries.

Dense low-growing form, perhaps to 4 or 5 ft. Modest white bracts in early or mid-May. CL, OL, SR, WN, 28.

***Cornus sericea* 'Kelsey' (3)**

KELSEY SHRUBBY DOGWOOD

Dense shrub to 2 ft., occasionally used as a rough ground cover. *C. sericea* commonly listed in catalogs as *C. stolonifera*. FO, HO, ME, 2, 21, 23.

Cotoneaster

***Cotoneaster adpressus* (4-3B)**

Prostrate deciduous shrub with rooting stems. Small pink flowers in May. Bright red berries in autumn. DA, FO, HR, KE.

Selected forms: Var. *praecox*. EARLY COTONEASTER. Dome-shaped to 1½-2 ft. Small dark green leaves turn red before dropping in autumn. Persistent berries. CL, CR, DA, GR, KR, ME, OL, WN, WU, 3, 5, 6, 10, 14, 20, 22, 25.*

'Tom Thumb'. Shrublet to 8-10 in., so compact it hardly creeps. Small leaves. Red berries. Bonsai candidate. FO, FX, HR, OL, SK, SS, WA, 25, 29.

***Cotoneaster apiculatus* (4)**

CRANBERRY COTONEASTER

Deciduous shrub to 3 ft. with horizontally spreading branches. Small shiny deep green leaves. Showy relatively large berries in autumn. BY, CR, FO, GR, HR, KE, MU, OL,

SR, WG, WN, 2, 3, 6, 7, 10, 17, 18, 20, 23.*

***Cotoneaster congestus* (*microphyllus glacialis*) (6)**

PYRENEES COTONEASTER

Exceptionally dense mound to 3 ft. Evergreen. Bright red berries in autumn. AL, CL, HR, KE, LO, OL, SR, 3, 7, 13, 16, 18, 20, 26.

***Cotoneaster dammeri* (4)**

BEARBERRY COTONEASTER

Prostrate shrub to 1 ft. with long trailing branches. Leaves evergreen, 1-in. long. Variable. Bright red berries. Ground cover. CR, KE, 6, 10, 13, 19, 25, 26.

Selected form: 'Skogholm'. Small-leaved shrub to 15-in. tall. Vigorously spreading. Profuse white flowers in May. Ground cover or accent plant. Semi-evergreen on Long Island. Choice. DA, FX, KE, KL, ME, PA, SR, WU, 2, 3, 6, 16, 18, 22, 29.

***Cotoneaster* 'Herbstfeuer' (*dammeri* x *salicifolius*) (6)**

Prostrate shrub with lustrous, leathery, willowlike leaves. Brilliant red autumn color. DA, KE, 18, 22, 29.

***Cotoneaster horizontalis* (4)**

ROCKSPRAY COTONEASTER

Horizontally spreading shrub, 2-3 ft. tall. Branching resembles a fish skeleton. Brilliant orange foliage in autumn. More-or-less evergreen in the South. Red berries. Handsome.

DA, EI, GI, HR, KE, ME, MU, WG, WN, 2, 3, 6, 10, 12, 14, 16, 18, 22, 26.*

Selected forms: 'Little Gem'. Prostrate, to 6-in. tall. No fruits. KE, ME, OL, SR, 7.

'Variegatus'. Leaves edged silver. FO, FX, HR, 19.

Cotoneaster microphyllus (6-5B)

SMALL-LEAF COTONEASTER

Dense mound to 2-2½ ft. Half-inch-long evergreen leaves. Needs more pruning than other forms to keep a good habit. Scarlet berries. Most of the low-growing cotoneasters are bonsai candidates, but this one especially so because of its small leaves. AL, ME.

Selected forms: 'Cochleatus'. CL, FO, GR, HR, 15, 19.

'Cooperi'. Trailing, forming a low mound. Slow-growing. FO, FX, HR, KE, SR, 7.

'Thymifolius'. The smallest-leaved cotoneaster. Distinctive, but it does not tolerate the winters of New York City very well. AL, BY, DB, FO, FX, HR, KE, 10, 19, 20, 29.

For other Cotoneasters see pages 36, 51.

Cotoneaster pannosus 'Nanus' (7)

DWARF SILVER-LEAF COTONEASTER

Dense shrub to 3 ft. with small silvery foliage retained far into winter. HR.

Broom

Cytisus decumbens (5-4B)

Prostrate broom to 8-in. tall. Bright yellow pealike flowers in May-June. Makes an interesting ground cover. As with all *Cytisus*, provide full sun and sharp drainage. Sometimes listed under *Genista*. CU, DB, SR, WO, 7.

Cytisus kewensis (ardoinii x albus) (6)

KEW BROOM

Mat 6-8 in. high. Very pale yellow flowers in early May. Pealike. AL, KE, 7, 26.

Cytisus purpureus (4)

Shrub to 1½ ft. with arching stems and clover-like leaves. Purple flowers in early May. OL.

For other Cytisus see page 37.

Irish-heath

Daboecia cantabrica 'Alba' (5)

Dense shrub to 1-1½ ft. Evergreen. Tiny white bell-shaped flowers through much of the summer. Heath relative. HR, SK, WO.

Daphne

Daphne burkwoodii 'Somerset' (caucasica x cneorum) (4-3B)

Round shrub to about 3 ft. Semi-evergreen in the North. Fragrant whitish-pink flowers in

mid-spring. Somewhat broader than tall. More vigorous and less temperamental than other daphnes. CL, WG, WN, WO, 6, 26.

'Carol Mackie' (4-3B)

Similar to above but with white leaf margins. OL, SR, WN, 7, 19.

Daphne cneorum (3)

ROSE DAPHNE

Grayish evergreen mound to about 10-in. high. Covered with small bright pink flowers in early May. Fragrant. Sometimes short-lived. CU, GR, KE, WG, WN, WO, 6.

Selected form: 'Ruby Glow'. Foliage green. Flowers deep pink. BY, DB, FO, LA, SK, WN, 19, 26.

Daphne collina (7-6B)

Dense evergreen shrub to 2-2½ ft. Dark green leaves. Fragrant rose-purple flowers in June. SK.

Daphne mezereum (4-3B)

FEBRUARY DAPHNE

Upright shrub to 3 ft. with clusters of lilac-purple flowers in very early spring. Attractive but toxic red berries. Since it is rather difficult to transplant, best obtain container-grown plant. Not always easy to establish. DB, GO, GR.

Daphne odora (7)

Evergreen shrub to about 4 ft. Intensely fragrant rose-purple flowers in late winter or very early spring. BR, GR, HE, 26.

Selected form: 'Marginata'. Leaves bordered white. WG.

Daphne retusa (6-5B)

Dense evergreen shrub to 2-2½ ft. Shiny green leaves. Fragrant white flowers tinged rose. Late April or early May. AL, SK.

Bush-honeysuckle

Diervilla lonicera (trifida) (3)

NORTHERN BUSH-HONEYSUCKLE

Open shrub to 3 ft. with lustrous green leaves. Small greenish-yellow funnel-shaped flowers in June. Useful for bank plantings or for a moderately shady spot. FO, GA, KE.

Diervilla sessilifolia (4)

SOUTHERN BUSH-HONEYSUCKLE

Suckering shrub to 4 ft. tall. Shiny foliage most effective in late spring. Rather attractive, small, deep yellow flowers in June. Bank cover. WB, WX, 18, 22.

Elsholtzia

Elsholtzia stauntonii (4)

Mint-family shrub to 4 ft. Lilac-purple flower spikes in late summer. While the wood is fully hardy on Long Island, the shrub may be treated as a die-back in colder areas. LA, ME.

Trailing-arbutus

Epigaea repens (3)

Evergreen shrublet with trailing stems. Clusters of sweetly scented pink-to-white flowers in early April. Difficult to establish. Buy pot-grown plants from commercial nurseries and set out in acid, humus-rich soil. CL, KE, WN.

Heath

Erica species and forms

A very large genus of evergreen shrubs. Culture same as for heather (*Calluna*).

Erica carnea (5)

Usually 8-12 in. tall in the rock garden. The many forms are valued for their long flowering season, beginning in winter and continuing into spring. Flowers, like those of heather, are small and bell-shaped. AL, CL, CU, DB, FX, KE, KT, SR, WG, WO, 7, 19.

Erica cinerea form:

'C.D. Eason' (5). To 6 in. Bright red flowers in summer. DB, KE, WO, 26.

Erica tetralix 'Con Underwood' (3)

Gray-green foliage. Thin decumbent branches. To 9 in. Crimson flowers through much of the summer. DB, KE.

Erica vagans form:

'Mrs. D.F. Maxwell' (5). Flowers cherry red, summer, Upright, to 1 ft. CU, DB, FX, KE, 19.

Euonymus

Euonymus fortunei 'Carrieri' (5)

GLOSSY WINTER CREEPER

Loose evergreen shrub to 4 ft. with shiny dark green leaves. Climbing habit if supported. Fruit resembles bittersweet. KE, WN.

Euonymus fortunei 'Colorata' (4)

Trailing shrub to 1½-2 ft. high. Foliage, retained through the year, turns purple in winter. Ground cover. EI, JU, KE, KR, LA, ME, MU, WB, WN, WU, 3, 6, 10, 12, 16, 18, 20, 22.*

Euonymus fortunei 'Kewensis' (5)

Prostrate, with long shoots of tiny leaves. Ground cover. CL, GI, LA, ME, OL, SK, SR, WN, 6, 7, 10.

Euonymus fortunei radicans (5-4B)

WINTER CREEPER EUONYMUS

Trailing or climbing evergreen shrub with shiny dark green leaves. Of interest as the hardiest evergreen vine. Often listed simply as *Euonymus radicans*. Ground cover. KE, WN, 10.

Euonymus fortunei 'Sarcocoe' (5)

Upright shrub to 4 ft. with glossy green leaves. Retains its foliage over winter in better condition in northern areas than the

species. FI, GI, HO, KE, KL, KR, MC, ME, PL, WO, WU, 6, 8, 18, 22, 23.*

Euonymus fortunei vegeta (5-4B)

BIG-LEAF WINTER CREEPER, EVERGREEN BITTERSWEET

Spreading evergreen shrub to 4 ft. Dull green leaves. Profuse bittersweetlike fruit persists far into winter. Semi-evergreen in colder parts of the North. BU, DA, EI, HO, KL, LO, MC, ME, WG, WN, WU, 2, 6, 8, 10, 18.*

Euonymus nana turkestanica ('Koopmannii') (4-3B)

FERN-LEAF EUONYMUS

Distinctive upright shrub to about 4 ft., 3-in.-long linear leaves. Evergreen in a mild winter in New York City; semi-evergreen northward. HO, VA.

For other *Euonymus* see p. 51.

Forsythia

Forsythia 'Arnold Dwarf' (5)

Shrub to 3-4 ft. Best kept to 1 ft. Given an occasional trimming, it makes a handsome bank cover. Refined foliage. Flowers sparsely. DB, KE, LA, SS, WN, WU, 10, 17, 18, 21.

Forsythia viridissima 'Bronxensis' (5)

BRONX FORSYTHIA

Shrub to 1 ft. high, twice as broad. Leaves small. Numerous small yellow flowers in early April. Not a good ground cover since it is shy to root. DB, GR, HO, HR, KR, OL, SK, SR, WN, 2, 6, 17, 20, 21, 23.

Huckleberry

Gaylussacia brachycera (6)

BOX HUCKLEBERRY

Spreading evergreen shrub to 1 ft. high. Small shiny green leaves. Ground cover. Acid soil. Handsome. KE, OL, SR, WN, 7.

Genista

Genista germanica (5)

Flat-topped shrub to 1 ft. Spiny. Bright yellow pealike flowers in late May or early June. *Genista* is closely related to *Cytisus* (broom). They require rather poor sandy soil and sharp drainage to thrive. DB, OL.

Genista lydia (hispanica lydia) (7)

Rock garden shrub to 2 ft. Bright yellow flowers in late May or early June. Rather showy. CU, DB, KE, OL, 7, 19, 20, 26.

Genista pilosa (prostrata) (5-4B)

Prostrate shrub to 1 ft. high. Yellow flowers in mid-May. BY, FO, FX, KE, OL, SK, SR, 7, 19, 26.

Genista sagittalis (4-3B)

Completely prostrate. Yellow flowers borne

on upright stems. Rather fast growing. AL, DB, OL, 7.

Genista tinctoria (2)

To 3 ft. Yellow flowers in late May. Showy for its size. CU, DB, FO, SK.

Genista villarsii (5)

Shrublet to 6 in. Stems grayish-green. Bright yellow flowers in late spring. AL, SK.

Shrub-veronica

Hebe cupressoides (7)

Globe-shaped evergreen shrub to about 3 ft. Pale blue flowers in late spring or early summer. *Hebe* is often placed under *Veronica* in catalogs. Provide dry sandy soil. SK, 15.

Hebe decumbens (7)

Compact evergreen shrub to about 15 in. Gray-green leaves with red margins. White flowers on short spikes. May. DB, OL.

Hebe hectori (7)

Evergreen shrub to 2-2½ ft. Glossy light green leaves. Flowers white or pinkish. SK, 15.

English Ivy

Hedera helix 'Conglomerata Erecta' (6)

BUNCH-LEAF IVY

Distinctive shrubby form to 1-1½ ft. Small, closely set, two-ranked leaves on stiffly upright stems. DB, GI, KE, 2.

St. Johnswort

Hypericum buckleyi (5)

Charming 10-in. mat with yellow flowers 1-in. across in late spring. Rock garden or ground cover use. CU, WX.

Hypericum calycinum (6)

AARONSBEARD HYPERICUM

Creeping shrub to 1 ft. high. Evergreen in the South. Yellow flowers over a long period in summer. Tolerates some shade, provided soil is sandy. Ground cover. CL, DB, LA, LO, ME, WG, 12, 13.

Hypericum frondosum (5)

Upright shrub to 3 ft. with abundant 2-in.-wide yellow flowers in summer. One of the best. WX.

Selected form: 'Sunburst'. WG, 11.

Hypericum 'Hidcote' (forrestii x calycinum?) (5)

Rounded shrub to 18 in. Yellow flowers most of the summer. Often herbaceous in the North. CR, DA, EI, HO, KE, KL, LO, WO, 2, 8, 10, 12, 18, 21.

Hypericum kalmianum (4)

Shrub to 3 ft. with persistent bluish-green leaves. Bright yellow flowers, 1-in. across, appear in early summer. Some material

offered may be *H. prolificum*. FI, GU, KE, WG, 6, 8.

Hypericum kouytchense (patulum 'Sungold') (5)

Similar to 'Hidcote' but reputedly a bit hardier. IT, LO, WG.

Hypericum moseranum (patulum x calycinum) (6-5B)

GOLD-FLOWER

Low shrub or loose ground cover with 2-2½ in.-wide yellow flowers over a long period in summer. Refined foliage. LO, 21.

Hypericum patulum henryi (6-5B)

HENRY ST. JOHN SWORT

Half-evergreen shrub to 2-3 ft. Spreading 2-in.-wide golden-yellow flowers in summer. LO, ME, 20.

Hypericum prolificum (4)

SHRUBBY ST. JOHN SWORT

Dense shrub to 3-4 ft. Fairly small bright yellow flowers in July. Shiny brown stems have winter character. GA, KE, WX, 8.

Japanese Holly

Ilex crenata 'Dwarf Pagoda' (6)

Picturesque evergreen shrublet with tiny coin-like foliage. A pistillate form with black fruit. For rock garden or bonsai. An 8-year-old plant is 6 in. tall and 10 in. across. DI, FX, KE, OL, SR, 1, 7.

'Green Dragon', which is staminate, grows to 2 ft. or more and is not as stable a cultivar. CO, FX, GR, HR, KE, OL, SR, WA, 1, 7, 19, 29.

Ilex crenata 'Green Lustre' (5)

Dense branching and compact habit, with an eventual height of 4 ft. Very glossy foliage. Hardier than most Japanese hollies. PR, 1, 2, 3, 4, 16, 25, 30.

Ilex crenata 'Helleri' (6-5B)

HELLER JAPANESE HOLLY

Very slow-growing, compact, evergreen, to 3-3½ ft. Cushion-like. Small glossy dark green leaves. One of the best. Bonsai candidate. CL, EA, FO, FX, HR, KE, ME, OL, SR, WN, WU, 1, 3, 7, 10, 12, 18, 19, 22, 29.*

Ilex crenata 'Hetzii' (5)

HETZ JAPANESE HOLLY

Spreading low evergreen shrub to about 2½ ft. high. The convex leaves are fairly large for a Japanese holly. GI, HO, KE, ME, MU, SR, WN, 1, 2, 4, 10, 12, 13, 16, 18, 20, 22.*

Ilex crenata 'Mariesii' ('Nummularia') (6)

Very slow-growing upright evergreen shrub to 3 ft. or more. Picturesque short stiff branches. Small rounded coinlike leaves. Bonsai candidate. DB, FX, GR, HR, SK, WA, 19.

Ilex crenata 'Piccolo' (6)

The midget of the group, growing perhaps to

1 ft. Tiny leaves. DL, FX, WA, 1, 15.

Ilex crenata 'Stokes' ('Stokes Dwarf') (5?)

Similar to 'Helleri', but slightly flatter in growth. Reportedly a bit hardier. Bonsai candidate. KE, PR, WN, WU.

For other Hollies see pages 17, 52.

Virginia Sweetpire

Itea virginica (5)

Dense shrub to 3 or 4 ft. with clusters of fragrant white flowers in early summer. Autumn foliage red. Moisture tolerant. SA, WX.

Kalmia (Laurel)

Kalmia angustifolia (2)

SHEEP LAUREL

Evergreen shrub to 3 ft. Clusters of rose-red flowers in early June. Requires moist, acid soil. AL, CG, DB, KE, SR, WA, 7.

Kalmia polifolia microphylla (3)

Semi-prostrate evergreen shrub to 1 ft. Narrow leaves. Conspicuous lavender flowers in May or June. Requires moist, acid soil. BO, GR, KE.

Kalmiopsis

Kalmiopsis leachiana (6-5B)

Shrub to 1 ft. with small evergreen leaves. Rosy-purple flowers in late May or early June. Full sun. Moist, peaty soil. FO.
Named form: 'Le Piniee'. BO, GR.

Labrador-tea

Ledum groenlandicum (2)

Evergreen shrub to 3 ft. Leaves woolly beneath. White flowers in late April. Suitable for a very moist or boggy site in acid, peaty soil. CU, DB, KE.

Sand-myrtle

Leiophyllum buxifolium (5)

Evergreen shrub to 1½ ft. Tiny leaves. Small white flowers in early May. BO, OL, WN, WX.

Selected forms: 'Nanum'. To 10 in. More-or-less prostrate. AL.

'Prostratum'. Completely prostrate. CU, OL, 7.

Leucothoe

Leucothoe axillaris (6)

COAST LEUCOTHOE

Evergreen shrub to 2 ft. with arching stems and dark green leaves. Small white bellshaped flowers in racemes. Late May. Provide acid soil for all leucothoes. Shade tolerant. CR, FO, KE, LO, OL, PA, SR, WN, WX, 2, 3, 7, 20, 22, 25, 29.

Leucothoe fontanesiana (catesbei) (5-4B)

DROOPING LEUCOTHOE

Evergreen shrub to 3-4 ft. Six-in.-long shiny leaves. Numerous but inconspicuous white heather-like flowers in late May. Foliage turns bronze in cold weather. CL, GA, GI, GR, KE, PO, PR, SR, WN, WU, WX, 3, 10, 13, 18, 22, 29.*

Selected forms: 'Girard's Rainbow'. Leaves colored green, pink and cream. Not as arching in habit as the species. CL, CR, GI, KE, PO, SS, WG, WN, 3, 6, 10, 18, 19, 25, 29.

'Nana'. Small; spreading habit. DB, 10, 25.

Leucothoe keiskei (5)

Graceful shrub to 3-4 ft. Three-in.-long leathery evergreen leaves. White flowers in mid-May. KE, OL.

Privet

Ligustrum obtusifolium 'Regelianum' (5)

REGEL PRIVET

Mounded shrub to 4-5 ft. with notably horizontal branching. It is not always easy to obtain the true form in the trade. Handsome. DA, DU, EI, JU, KE, PL, WB, WN, 6, 10, 18, 21, 22.

Ligustrum 'Suwanee River' (7)

Compact evergreen shrub to about 4 ft. Thought to be a hybrid of *L. japonicum* 'Rotundifolium' and *L. lucidum*. 20.

Ligustrum vicaryi (ovalifolium 'Aureum' x vulgare) (5)

VICARY GOLDEN PRIVET

Slow-growing shrub to 4-5 ft. with golden-yellow foliage through the summer. Full sun. DA, IT, JU, KE, KL, KR, MC, ME, MU, 2, 4, 6, 10, 13, 16, 20, 21, 22.*

Ligustrum vulgare 'Lodense' ('Nanum') (4)

Dense mound to 4 ft. Suitable as a low deciduous hedge. No trimming necessary. Attractive. ME, PL, WN, 6, 20, 21.

For other Privet see page 53.

Alpine-azalea

Loiseleuria procumbens (2)

Evergreen shrublet to 6-8 in. with small leaves. Small pink flowers in early summer. Moist, acid soil. AL.

Honeysuckle

Lonicera nitida (7-6B)

BOX HONEYSUCKLE

Handsome evergreen shrub to about 4 ft. Small glossy leaves. Sometimes used as a low hedge in the South. DB, FO, GR, HR, 19.

Lonicera pileata (6-5B)

PRIVET HONEYSUCKLE

Horizontally branched shrub of small to medium size, evergreen in the South. Dense. Small shiny green leaves, refined for a honey-suckle. Amethyst-violet berries. DB, FO, ME, WG, 2, 23.

Lonicera xylosteoides 'Clavey's Dwarf' (tatarica x xylosteum) (4)

Shrub to 3-4 ft., used occasionally for a quick low hedge in cold climates. Inconspicuous white flowers. FI, GU, HO, IT, JU, KL, KR, MC, PL, WU, 2, 6, 17, 21.

Mahoberberis

Mahoberberis aquicandidula (Mahonia aquifolium x Berberis candidula) (5)

Fine-textured evergreen-shrub to about 4 ft. with small spiny, hollylike leaves. Sparsely branched. Benefits from a sharp pruning in early spring. Shade required. Other similar crosses have occurred, but this hybrid seems the most ornamental because of its small foliage. WN.

Mahonia

Mahonia aquifolium (5)

OREGON-GRAPE

Rather open-growing evergreen shrub to 3-4 ft. Shiny leaves resemble those of English holly. Small bright yellow flower spikes in late April and bluish-black berries in fall. Purple autumn foliage. Needs winter shade in the North. Very variable. BR, BU, CL, FO, KE, KR, ME, SI, WB, WG, WN, WU, YE, 3, 6, 10, 14, 22, 23, 26.

Selected form: 'Compacta'. Dense. HO, 20, 23.

Mahonia nervosa (5)

Mounded evergreen shrub to 2 ft. Shiny leaves. Large clusters of blue-black berries in autumn. BO, BR, FO, YE.

Mahonia repens (5)

Creeping evergreen shrub. Height about 1 ft. Yellow flowers in late April, blue-black fruit in autumn. BO, BR, CU, SI, WU, YE, 15, 26.

For other Mahonia see page 54.

Tree Peony

Paeonia suffruticosa (5-4B, with protection)

Open-growing shrub to 4-5 ft. Flowers large, white to pink and red; single or double. Many named forms. CL, KE; also from Louis Smirnow, 85 Linden Lane, Glen Head P.O., Brookville, N.Y. 11545.

Pernettya

Pernettya mucronata 'Red' (7-6B)

Dense evergreen to 2-3 ft. Bright red berries

retained all winter. For best fruiting, plant other forms as well. 19. 'White'—white-fruited form. 19.

Pieris

Pieris floribunda (4)

MOUNTAIN PIERIS

Handsome evergreen shrub usually growing to only 4-5 ft. in northern gardens. More-or-less upright clusters of white flowers in April. It is subject to lacewing infestation unless grown in shade or partial shade. CR, CU, EI, OL, WN, WU, 7, 10, 26.

Pieris 'Forest Flame' (forrestii x japonica) (7-6B)

Evergreen. New growth bright red. CL, FX, GR, KE, WA, 7, 15, 19, 26.

Pieris japonica 'Bisbee's Dwarf' (5)

Tight little globe to 1 ft. with attractive small leaves, which are red when young. Few or no flowers. CU, DB, FX, GR, OL, SK, SR, WA, 7, 19, 29.

Pieris japonica 'Compacta' (5)

Evergreen shrub to about 4 ft. Leaves smaller than in *P. japonica* (see p. 40). CL, DB, FX, KE, OL, SS, WA, WN, 3, 4, 5, 8.

Pieris japonica 'Dorothy Wyckoff' (5B)

Superb deep purple-green winter foliage if grown in full sun. Flower buds pink. Choice. CU, FX, KE, OL, WA, WN, 4, 29.

Pieris japonica 'Pygmaea' (5B)

Evergreen shrub to 2 ft. Leaves needlelike. AL, BO, CU, DB, FO, FX, GR, HR, KE, OL, SK, SS, WA, 5, 19, 25, 29.

Pieris japonica 'Variegata' (5B)

Evergreen leaves have narrow white edges. Very slow-growing to about 2 ft. AL, BR, CL, DB, FX, GR, KE, ME, OL, PO, WA, 4, 7, 19, 26, 29.

For other Pieris see page 40.

Potentilla, Bush-cinquefoil

Potentilla fruticosa (2)

BUSH-CINQUEFOIL

Usually a mounded shrub to 3-3½ ft. Small leaves. Yellow flowers in late spring with occasional bloom through summer. Many forms, most with only slight differences.

Selected forms: 'Abbotswood'. White flowers. BY, FO, GR, ME, WG, WU, 17, 19, 20.

'Gold Drop' ('Farreri'). Deep yellow flowers. BY, CR, DA, EI, KL, LA, OL, SS, ST, WU, 6, 8, 17, 23, 26.

'Goldfinger'. Profuse large yellow flowers. HO, OL, WG, WU, 17, 19, 20, 21, 23, 26.

'Jackman's Variety'. Bright yellow flowers, rather large. GU, HO, IT, OL, SR, WN, WU, 6, 17, 18, 21, 23.



The upright creamy April flowers of mountain pieris (*P. floribunda*) contrast well with the dark green foliage.

'Longacre'. Low spreader, large yellow flowers. FO, WN, 19.

'Primrose Beauty'. ME, WN, 19, 20.

'Red Ace'. Orange-red depending on soil and weather conditions. EI, HO, PL, SS, WG, WU, 3, 6, 20.

'Tangerine'. Flowers orange, if grown in part shade. BR, FO, GR, KE, ME, WG, WN, 15, 19, 26.

Flowering Almond

Prunus glandulosa 'Albiplena' (5)

DWARF WHITE FLOWERING ALMOND

Shrub to 3-4 ft. Attractive double white flowers in late April. LA, WN, 8, 10.

Prunus glandulosa 'Sinensis' ('Rosea' of the trade) (5)

DWARF PINK FLOWERING ALMOND

Shrub to 3-4 ft. Profuse double light-pink flowers, especially attractive in bud. Late April. BU, CL, FI, GI, GU, HO, IT, KL, LA, MC, SR, WN, WU, 6, 8, 10, 11, 21, 22, 23.

Prunus tenella (2)

DWARF RUSSIAN ALMOND

To 3-4 ft. A profusion of pink flowers in early May. VA.

Azalea

Rhododendron 'Gumpo' ('White Gumpo') (6)

Dwarf compact evergreen shrub with exceptionally large white flowers in late spring or early summer. BO, CG, CL, CU, DB, FX,

GR, HR, KE, OL, PA, SR, WG, 7, 16, 19, 22, 26.

Rhododendron indicum 'Balsaminiflorum' (6B)

Dwarf evergreen shrub to 1½-2 ft. Double salmon-pink flowers in June. Needs shade from direct sun to preserve color. CG, GR, HO, OL, SR, WT, 7.

Rhododendron indicum 'Flame Creeper' (6B)

Low-growing, semi-prostrate evergreen shrub with orange-red flowers in late May. CG, DB, FX, OL, SR, 7, 26.

Rhododendron North Tisbury Hybrids (6)

Ground covers based in part on *R. nakaharai*. BO, CG, OL, SR, WN, 7.

Rhododendron 'Pink Gumpo' (6)

Similar to 'Gumpo', but with pink flowers. BO, CG, CL, CU, DB, FX, GR, HR, KE, OL, WG, 16, 19, 22, 26.

For other Azaleas see page 40.

Rhododendron

Rhododendron 'Anna Baldsiefen' (5B)

Compact shrub to 1½ ft. or more. Small evergreen leaves with many vivid light-rose flowers in late April or early May. CG, CU, HR, OL, 27.

Rhododendron 'Bow Bells' (williamsianum hybrid) (5)

Dense shrub to 3 ft. with light evergreen leaves. Large bell-shaped pink flowers in late April or early May. GO, GR, 7, 27.

Rhododendron 'Dora Amateis' (carolinianum x ciliatum) (5B)

Spreading mound to 3 ft. with white flowers 2-in. across in late April. Leaves and flowers are unusually large for the size of the plant. BO, BY, CG, CL, CR, CU, FX, OL, PR, SR, WA, WN, WU, 5, 7, 25, 26, 27, 29.

Rhododendron 'Elizabeth' (repens x griersonianum) (6)

Dense semi-prostrate shrub to about 3 ft. Large evergreen leaves. Large dark red flowers in April. GR, 27.

Rhododendron fastigiatum (4)

Compact, upright to 18 in., with attractive small lilac-purple flowers in May. Diminutive foliage. CG, CU, GR, OL, SR, 7, 27.

Rhododendron ferrugineum (4B)

ALPEN-ROSE

Rounded shrub, eventually to 3-4 ft., that is prized mostly for its rather small evergreen leaves, rusty beneath. Rosy-lilac flowers of modest size in June or July. Thrives in cool climate. GR, WU.

Rhododendron impletum (4B)

Compact mound to 15-18 in. Scaly evergreen leaves ½-in. long, ¼-in. wide. Flowers purplish-blue to lavender-pink. AL, CL, DB, FX, GR, HR, KE, ME, 19, 25, 26, 27.

Rhododendron keiskei (dwarf form) (5)

Compact low evergreen shrub, small leaves. Lemon yellow flowers in mid-April. CU, FX, GR, KE, OL, SR, WA, 7, 19, 27, 29.

Rhododendron 'Myrtifolium' (minus x hirsutum) (5)

To 3 ft., with small rose-pink flowers in late spring. Leathery, light green foliage becomes bronze in winter. BO, GR, OL, SS, WA, WN, 18, 25, 27.

Rhododendron P.J.M. Hybrids (carolinianum x dauricum) (5)

Tight mound to 4 ft. or more with small evergreen leaves which become purplish-bronze in winter. Lavender-pink flowers in early or mid-April. Slight variations in flower color and habit may be expected. CG, CL, CU, GI, GR, IT, JU, KE, OL, PR, WA, WG, WN, 4, 6, 7, 18, 25, 27, 29.*

Named selections: WN, 4, 29.

Rhododendron racemosum (5)

Dense shrub to 18 in. or more. Small evergreen leaves. Pinkish-white flowers in early May. CG, CU, GO, GR, OL, SR, 7.

Rhododendron radicans (5B)

Prostrate evergreen shrublet to 6 in. high. Leaves bright green. Comparatively large purple flowers in May. AL, GR.

Rhododendron 'Ramapo' (4)

Compact evergreen mound to 2 ft. or more.

Small, light blue-green foliage. Pale violet flowers in late April or early May. BO, CG, DB, GR, WN, WU, 6, 25, 26, 27, 29.

Rhododendron rupicola (6)

Evergreen cushion to about 15 in. high. Dark violet-purple flowers in May. Native to limestone cliffs in Yunnan. CU, GR, WN.

Rhododendron williamsianum (5)

Evergreen shrub to 2 ft. or more. Spreading. Fairly small coinlike leaves, tinged bronze. Large shell-pink flowers in April. AL, GO, GR, WA, 19.

Rhododendron yakusimanum and Selections (4)

Domed shrub to about 2½ ft. Evergreen leaves with conspicuous indumentum. Pink flower clusters, turning white. May. CL, FX, GO, GR, KE, OL, PR, SH, SS, WG, 4, 27.

For other Rhododendrons see page 43.

Jetbead

Rhodotypos scandens (kerrioides) (5)

Shrub to about 4 ft.; 2-in.-wide white roselike flowers in early May, briefly retained. Shiny black fruit usually lasts well into winter, and birds will eat it when other fruits are scarce. Not a first-rate shrub, but useful in a wild-life planting. EI, WU, 8, 18, 23.

Sumac

Rhus aromatica (canadensis) (3)

FRAGRANT SUMAC

Vigorous prostrate shrub to 3 ft., several times broader than tall at maturity. Yellowish flowers in late April. Orange-yellow autumn color. Bank cover. EI, WN, 6, 10, 11, 18, 21.

Named form: 'Gro-low'. 6.

For other Sumacs see page 57.

Rose-acacia

Robinia hispida (5-4B)

Loose shrub to 3 ft. or more, with attractive purplish-rose pea-like flowers in late May. Stems with red bristles. Useful for bank planting because of its suckering habit. GA, 6, 10, 18.

Rose

Rosa nitida (3)

Shrub to 2-3 ft. with single rosy-red flowers in late May or June. Small red fruit. Lustrous foliage. 22.

Rosa rugosa hybrid 'Max Graf' (3)

Trailing rose with single pink flowers. Ground cover. WN.

Rosa wichuraiana (5)

MEMORIAL ROSE

Trailing shrub suitable as a bank cover. Two-in.-wide white flowers in early summer.



The handsome shiny dark green leaves of *sarcococca* are complemented by fragrant white flowers in midspring.

Shiny foliage retained late in autumn. Fruits red. FO, WG, WN, 6, 12, 16, 18, 22.

For other *Roses* see page 43.

Butcher's-broom

Ruscus aculeatus (7)

Evergreen to 4 ft. with stiff cladodes, which give the appearance of leaves. Flowers dioecious, inconspicuous, early spring. On pistillate plants red berries last most of the winter. AL, WX.

Willow

Salix purpurea 'Gracilis' ('Nana') (3)

DWARF ARCTIC WILLOW

Compact shrub to 4 ft. Grayish foliage. Useful for low hedges. FO, HR, KL, KR, MC, ME, WG, WN, WU, 6, 18, 21.

Salix repens (4)

CREeping WILLOW

Prostrate shrub to 3 ft. high. Ascending branches; small leaves. BO.

Salix retusa (1)

Prostrate low shrub with small leaves. Slow growing for a willow. Miniature catkins. AL.

Sarcococca

Sarcococca hookerana humilis (6-5B)

Shrub to 6 in. Handsome evergreen leaves. Fragrant small white flowers. Ground cover. CL, DA, DB, KE, SR, WG, 7, 26.

Sarcococca ruscifolia (7)

Evergreen shrub to 4-5 ft. Roundish deep green leaves. Inconspicuous but fragrant flowers in autumn or early winter. Dark scarlet berries. Shade. ME, 26.

Siphonosmanthus

Siphonosmanthus (Osmanthus) delavayi (7)

Evergreen shrub with small glossy dark green leaves. Handsome. Blue-black berries. BO.

Skimmia

Skimmia japonica (6B)

JAPANESE SKIMMIA

Handsome compact evergreen shrub to 4 ft. Bright red berries retained over a long period in autumn. Dioecious. Modestly ornamental, fragrant yellowish-white flowers in late April or early May. This and the following species require winter shade. CL, DA, DB, KE, OL, PA, PO, SR, WG, 19, 26.

Skimmia reevesiana (6B)

REEVES SKIMMIA

Evergreen shrub to 1½ ft. Small white flowers. Dull red berries, borne on each plant, retained late into winter. Ground cover. CU, DI.

Spiraea

Spiraea albiflora (callosa alba) (4)

JAPANESE WHITE SPIREA

Tight mound to 18 in. Flat clusters of white flowers in early summer. WU.

Spiraea bumalda 'Anthony Waterer' (japonica x albiflora) (3)

Dense shrub to 3 ft. Flat clusters of crimson flowers in early summer. Prune spent flower stalks to promote bloom. DA, EI, FI, HO, JU, KE, PL, SR, WN, WU, 2, 6, 11, 16, 17, 20.

Other forms: 'Crispa'. To 18 in. Small twisted leaves, refined for a spiraea. KR.

'Froebeli'. FROEBEL SPIREA. Similar to 'Anthony Waterer', but slightly taller and with sufficient new growth in summer to hide the spent flowers. HO, KE, ME, PL, VA, WN, WU, 6, 11, 17, 21.

'Goldflame'. Foliage yellow and red in spring. Prune in late spring so summer growth will also be brightly colored. AE, CL, FI, FO, GI, HO, JU, KR, ME, SS, WG, WU, 2, 6, 11, 17, 20, 21.

Spiraea japonica 'Alpina' (5)

JAPANESE ALPINE SPIREA

Tight mound to 1 ft. Light pink flowers in mid-June. Refined. AL, BY, CL, CR, FO, FX, KE, ME, WG, WN, 2, 6, 22, 23, 25.

Spiraea japonica 'Atrosanguinea' ('Coccinea') (5)

Shrub to 4 ft., new foliage reddish. Flat clusters of deep crimson flowers in summer. CL, CR, DA, IT, KL, MC, 2, 21.

Spiraea japonica 'Bullata' (5)

Twiggy shrub to 15 in. Dark crinkly leaves. Bright pink flowers in early summer. AL, DB, FO, SK.

Spiraea japonica 'Shirobana' (5)

Shrub to 3 ft. with some flower clusters pink, others white. Summer bloomer. KE, WG, 15.

Stephanandra

Stephanandra incisa (flexuosa) 'Crispa' (5)

DWARF STEPHANANDRA

Suitable as a ground or bank cover. Best trimmed in early spring to retain good form. Its suckering habit can make it a nuisance in small gardens where it is often planted because of its neat foliage. CL, DB, FO, KE, OL, WG, WU, 2, 6, 7, 25.

Blueberry, Cranberry

Vaccinium macrocarpon 'Hamilton' (2)

DWARF TRUE CRANBERRY

Creeping shrublet to 8 in. high. Tiny leaves, red fruit. Sun, fairly moist soil. DB, OL, SR, 7.

Vaccinium vitis-idaea minus (3)

MOUNTAIN CRANBERRY

Mat-forming shrublet to 4 in. high. Very small leaves. Pinkish-white flowers in mid-May. Red berries. Full sun. Ground cover. BO, BY, CL, DB, OL, SR, WN, 7.

Viburnum

Viburnum davidii (7)

DAVID VIBURNUM

Compact evergreen shrub, usually to only 3 ft. in the U.S. Grown mainly for its long, deeply creased leaves. Small white flower clusters in late May or June. Occasionally with light blue berries in autumn. Handsome ground cover in the Northwest. HE, 15, 19, 20, 26.

Viburnum opulus 'Nanum' (4?)

Unusually dense, almost ball-shaped shrub to about 3 ft. Grown chiefly for its refined, closely set, small leaves. Non-flowering. Not to be confused with 'Compactum' (see page 58). BO, CL, DB, HO, JU, SK, VA, WN, WU, 2, 6, 10, 21, 22.

Viburnum plicatum 'Fujisanensis' (5)

DWARF DOUBLE-FILE VIBURNUM

Grows slowly to 3 ft. In May flat flower clusters surrounded by conspicuous white sterile florets. Repeat bloom. AL, LA.

For other Viburnums see pages 47, 58.

Yellow-root

Xanthorhiza simplicissima (apiifolia) (4)

Stoloniferous shrub to 2 ft. high. Finely cut leaves. Tiny but interesting brownish-purple flowers in late April. A vigorous spreader, useful as a ground cover. GA, WN, WX, 10, 22.

DWARF CONIFERS

Low-growing or Slow-growing Conifers

Fir

***Abies balsamea hudsonia* (3)**

Flat-topped deep green form to about 2½ ft. AL, CR, KT, SP, WA, WO, 25.

***Abies balsamea 'Nana'* (3)**

Unusually slow-growing, ball-shaped fir to 1½ or 2 ft. CO, DB, FX, GR, HU, KE, KT, OL, PO, SK, SP, SR, WA, WN, 5, 7, 19, 26.

***Abies concolor 'Compacta'* (4)**

Irregular, flat-topped; to about 2½ ft. Gray needles. CO, GR, KE, KT, TW, 29.

***Abies koreana 'Prostrata'* (5)**

Low, compact, spreading shrub with horizontal or upturned branches. FX, KE, OL, SP, WN, WO, 29.

***Abies lasiocarpa 'Compacta'* (6)**

Broadly conical, densely branched; blue-gray foliage. Vigorous. CO, KT, OL, SP, TW, WN, WO, 29.

***Abies procera (nobilis) 'Prostrata'* (4)**

Irregular, more-or-less flat-topped; to 3 ft. Glaucous foliage. CL, CO, FX, KE, OL, TW.

Cedar

***Cedrus libani 'Comte de Dijon'* (6)**

Dense, broadly conical; to 4-5 ft. Short needles. CO, KT.

***Cedrus libani 'Sargentii'* (6)**

Very dwarf and unusually slow-growing; pendulous branches. FX, GR, KT, SP, WN, 27, 29.

False-cypress

Note: The name "Retinospora" (more correctly "Retinispora"), which was used in the 19th century for certain false-cypress forms with awl-shaped ('juvenile') leaves, is obsolete botanically, but is still sometimes used. Some nurseries still list *Chamaecyparis* under "Retinospora."

***Chamaecyparis lawsoniana 'Ellwoodii'* (6-5B)**

Slow-growing shrub to about 8 ft. Spirelike. GR, KE.

***Chamaecyparis lawsoniana 'Forsteckensis'* (6)**

Dense globe with congested growths. A slow-growing form with gray foliage. Eventually to about 1½ ft. FX, GR, SP.

***Chamaecyparis lawsoniana 'Gimbornii'* (6)**

Oval form to about 2 ft. Rigid, slow-growing. SP, 29.

***Chamaecyparis lawsoniana 'Minima'* (6)**

Broad-based conical shape. Slow-growing to 2-2½ ft. Light green. CU, FX.

***Chamaecyparis lawsoniana 'Minima Glauca'* (6)**

Distinctive for its metallic blue-gray foliage. To about 3 ft. DB, SP, WN.

***Chamaecyparis lawsoniana 'Pygmaea Argentea'* (6)**

Slow-growing to about 2 ft. Variegated. KE, SP.

***Chamaecyparis obtusa 'Caespitosa'* (5)**

One of the smallest conifers, seldom more than 8-10 in. high. Ball-shaped. KT, SP.

***Chamaecyparis obtusa 'Coralliformis'* (5)**

Twisted cordlike branches with adpressed leaves. To 3 ft. or more. AL, BO, CR, DB, FX, GR, KT, PO, SP, SR, SS, WA, 7, 25, 29.

***Chamaecyparis obtusa 'Juniperoides'* (5)**

Very slow-growing, forming a tight green ball seldom more than 1 ft. AL, BY, FX, GR, HU, KE, KT, SP.

***Chamaecyparis obtusa 'Lycopodioides'* (5)**

Shrub to 4½ ft. or more. Branches irregularly crowded. Loose growth habit. CO, DI, KE, KT, SP, WN, WO, 14, 28.

***Chamaecyparis obtusa 'Lycopodioides Aurea'* (5)**

Similar to the preceding, but with yellow foliage. Slower-growing. KE, KT, SP, 28.

***Chamaecyparis obtusa 'Mariesii' ('Nana Albovariegata')* (5)**

Unusually slow-growing conical shape to about 2 ft. Variegated. AL, CO, CU, DB, DI, FX, GR, KE, KT, PO, SP, WA, 19, 28, 29.

***Chamaecyparis obtusa 'Nana'* (5)**

Exceptionally slow-growing. Squat habit. To 2 ft. Dark green. Choice. AL, CU, DI, FX, GR, HR, KE, KT, PO, SK, SP, SR, TW, WA, 5, 19, 25, 26, 29.

***Chamaecyparis obtusa 'Nana Aurea'* (5)**

Similar to 'Nana', but with golden fans of foliage and much more vigorous. To 6 ft. DI, FX, GI, GR, KT, SR, WA, 7.



Gottsche-Schlesner

The broad conical shape and handsome foliage of *Chamaecyparis obtusa* 'Nana Gracilis' will remain stable because it grows very slowly.

***Chamaecyparis obtusa* 'Nana Gracilis' (5)**

Slow-growing; broad conical shape and deep green foliage. Takes many years to attain 7 ft. AL, CO, DI, FO, FX, GI, GR, HR, KE, KT, OL, SR, WA, WO, 5, 7, 19, 22, 25, 26.*

***Chamaecyparis obtusa* 'Pygmaea' (5)**

Dwarf and spreading, always broader than tall, with dense fans of foliage. AL, DB, DI, FX, GR, KT, PO, SP, SR, WA, 7, 19, 29.

***Chamaecyparis obtusa* 'Spiralis' (5)**

Small, stiffly upright form with curiously twisted branchlets. Distinct. FX, KE, KT, 29.

***Chamaecyparis obtusa* 'Tetragona Aurea' (5)**

Slow-growing to 6 ft. or more. Compact, conical. Short crowded branches. Yellow foliage. CO, DA, DB, FX, GR, HR, KE, KT, OL, PO, SP, SS, WA, WO, 7, 25, 28, 29.

***Chamaecyparis pisifera* 'Filifera Aurea Nana' ('Golden Mop') (4)**

Compact, bright golden thread-leaf globe to 3 ft. Often confused with 'Filifera Aurea', which is a pudgy small tree. CL, CO, CR, FX, GR, KT, OL, PO, SR, WA, 5, 7, 18, 19, 25, 28, 29.

***Chamaecyparis pisifera* 'Filifera Nana' (4)**

Diminutive version of thread-leaf false cypress, growing to about 3 ft. AL, DB, KE, KT, PO, WA, WN.

***Chamaecyparis pisifera* 'Nana' (4)**

Squat, more-or-less globose. Glaucous foliage. To about 2 ft. in old age. DB, GR, KE, SP, WA, WO, 19.

***Chamaecyparis pisifera* 'Plumosa Nana Aurea' (4)**

Slow-growing rounded form. To 2½ ft. Lacy branchlets. Young foliage golden yellow. AL, GR, KE.

***Chamaecyparis pisifera* 'Squarrosa Intermedia' ('Minima') ('Squarrosa Pygmaea') (4)**

Attractive in youth, resembling a large, silver blue golf ball. Remove vigorous whip-cord shoots as they appear, or they will take over and the plant will form a pyramidal 10-12 ft. tree of totally different appearance. This instability has caused nomenclatural confusion. CL, DB, DI, HR, KE, KT, ME, OL, SP, SR, WA, WN, WO, 7, 19, 25, 28, 29.

***Chamaecyparis thyoides* 'Andeleyensis' (4)**

This form of Atlantic white-cedar makes a tight pyramid to 8 or 9 ft. Gray-green foliage is mostly fan-shaped. Moisture tolerant. DI, FO, GR, ME, WA, WN, 7, 19, 25, 29.

***Chamaecyparis thyoides* 'Little Jamie' ('Rezek Dwarf') (4)**

Diminutive version of 'Andeleyensis', ultimately one-fifth of its size. CU, DI, SP.

Cryptomeria

***Cryptomeria japonica* 'Elegans Nana' (6)**

Vigorous shrub to about 3 ft. Feathery foliage, purplish in winter. Distinct, but ages poorly. AL, CL, CU, DB, DI, GR, HR, KE, SP, WA, 28, 29.

Cryptomeria japonica 'Globosa Nana' (5)

Tight globe growing to perhaps 3 ft. Yellowish-green foliage in summer, slightly blue in winter. DB, DI, KE, SP, SR, WA, 7, 29.

Cryptomeria japonica 'Jindai-Sugi' (6)

Compact, upright habit, to 5 ft. or more. Slightly flattened top. GR, 29.

Cryptomeria japonica 'Knaptonensis' (6)

Tight cushion, growing slowly to about 2 ft. AL, BO, DB, FX, GR, SP, 19.

Cryptomeria japonica 'Monstrosa Nana' (6)

Irregular, broadly pyramidal, to about 3 ft. Growth more-or-less congested. Best seen before giving it a trial. AL, SP.

Cryptomeria japonica 'Pygmaea' (6)

Slow-growing, irregularly flat-topped; to about 3 ft. Reddish-bronze in winter. AL, CU, FX, KE, SP.

Cryptomeria japonica 'Spiralis' (6)

Slow-growing, rather open habit to about 3 ft. Needles twisted spirally along the stem. AL, FX, GR, OL, PO, SP, 19.

Cryptomeria japonica 'Vilmoriniana' (6)

Dense rigid globe attaining 2-2½ ft. after many years. Foliage turns brown in winter, but not objectionably so. Handsome. AL, BO, CL, DB, DI, FX, GR, OL, SP, SR, WA, 7, 19, 29.

Juniper

Juniperus chinensis 'Armstrongii' (4)

Dense shrub to 3 ft. high and as much across. Branches wide-spreading. Soft gray-green foliage. Shrubby forms of *J. chinensis* are occasionally listed under *J. media* (*chinensis* x *sabina*). HO, 11, 20, 30.

Juniperus chinensis 'Blaauw' (4)

Dense shrub to about 4 ft. with spreading branches. Somewhat vase-shaped. Leaves mostly scalelike, blue-green. GR, HR, ME, PO, VA, WA, WN, 2, 10, 14, 18, 19.

Juniperus chinensis 'Hetzii' (5-4B)

HETZ JUNIPER

Broad upright shrub to 10 ft. or more. Vigorous, fountain-like effect with age. Gray-green foliage. Hardly a dwarf, but included here for convenience. GI, KE, KL, ME, SR, WB, WN, WU, 2, 3, 6, 10, 11, 12, 14, 16, 18, 19, 22, 30.*

Juniperus chinensis 'Old Gold' (4)

Wide-spreading compact shrub to 3-4 ft. Golden foliage. 'Gold Coast' is very similar. BR, DB, GI, GR, KE, OL, PL, WU, 2, 3, 6, 7, 16, 19, 29.

Juniperus chinensis 'Pfitzeriana' (4)

PFITZER JUNIPER

Vigorous broad shrub to 5 ft. or more. Gracefully irregular, arching branches. Foliage bright green to blue-green. Popular with reason. Most nurseries.

Juniperus chinensis 'San Jose' (4)

Spreading, loosely prostrate shrub to about 2 ft. high at maturity, but much broader. Gray-green. KE, SR, SS, 2, 3, 6, 8, 10, 12, 13, 16, 19, 20, 26, 29, 30.

Juniperus chinensis sargentii (4-3B)

SARGENT JUNIPER

Prostrate shrub to about 2 ft. high, spreading to as much as 10 ft. wide. Light green or bluish-green. Bonsai candidate, as are many other shrubby kinds of Chinese juniper. BO, GI, HO, HR, KE, PL, SR, WN, 3, 8, 12, 16, 18, 19, 20, 22.

Juniperus chinensis 'Sargentii Glauca' (4)

Similar to the preceding, but with glaucous foliage. CL, CR, GI, KE, OL, SR, SS, WN, 6, 8, 10, 13, 14, 20, 29.

Juniperus communis 'Berkshire' (4)

Attractive dense form of the field juniper. The original is about 15 in. tall and 3 ft. wide. DI, OL, SP, 7, 28.

Juniperus communis 'Compressa' (5)

Very slow-growing sharply columnar form. Rarely attains 3 ft. Resembles a miniature Italian cypress. CU, GR, HR, KE, KT, OL, SK, SP, SR, WN, WO, 7.

Juniperus communis 'Depressa Aurea' (4)

Prostrate shrub to 2-2½ ft. high, broadly spreading. Leaves shaded golden yellow to bronze. DB, OL, WA.

Juniperus communis 'Echiniformis' (4)

A tiny prickly hummock. Slow-growing to about 1 ft. Distinctive. FX, KE, KT, SP, 28.

Juniperus communis 'Hornibrookii' (4)

Ground-hugging mat to 2 ft. high. small leaves densely crowded on the branches. DB, KE, WN, 7.

Juniperus communis 'Repanda' (4)

Dense prostrate shrub to about 1 ft. WA.

Juniperus conferta (5)

SHORE JUNIPER

Creeping prostrate shrub, ultimately to 1½ ft. high. Young growth light green, later grayish. BO, CR, DA, KE, PA, 2, 7, 10, 12, 13, 16, 18, 22, 30.

Selected form: 'Blue Pacific'. Foliage blue-green. OL, WA, 3, 5, 12, 16, 25, 26, 30.

Juniperus davurica 'Expansa' (squamata 'Parsonii') (4)

PARSONS JUNIPER

Spreading flat-topped shrub. Gray-green. Ultimately a broad dome to 3 ft. tall. Branches horizontal, held above ground. GI, KE, WA,



A superb specimen of dwarf Japanese juniper (*Juniperus procumbens* 'Nana') spills over a stone wall.

3, 5, 7, 16, 20, 25, 29.

***Juniperus horizontalis* (3)**

CREeping JUNIPER

Prostrate mat with long creeping branches. To 1 ft. high. Gray or bluish-green foliage. This and its forms are handsome ground or bank covers on sunny sites. DB, KE, WN.

***Juniperus horizontalis* 'Bar Harbor' (3)**

Dense mat. Steel blue foliage. GI, KE, KT, ME, MU, OL, SR, WN, 3, 6, 8, 10, 12, 13, 16, 19, 20, 22.*

***Juniperus horizontalis* 'Blue Chip' (3)**

Silvery blue, spreading mound. Good year-round color. CR, DB, DI, GI, GR, MU, OL, 3, 19, 20, 23, 26.

***Juniperus horizontalis* 'Douglasii' (3)**

WAUKEGAN JUNIPER

Prostrate branches and ascending branchlets. Blue-green in summer, purple in winter. WN, 8, 10, 18.

***Juniperus horizontalis* 'Plumosa' (4)**

ANDORRA JUNIPER

Spreading, prostrate. To 2 ft. Light green. It is available from most nurseries.

***Juniperus horizontalis* 'Plumosa Compacta' (4)**

Prostrate compact form of Andorra juniper. CL, CR, EI, ME, PA, WN, 3, 6, 10, 12, 13, 19, 23, 25, 26.

***Juniperus horizontalis* 'Wiltonii' (3)**

BLUE RUG JUNIPER

Silvery blue carpet. One of the best. BY, FX, KE, KL, LA, MU, OL, PL, SR, WG, WN, 2, 3, 4, 5, 6, 10, 16, 18, 22.*

***Juniperus procumbens* (5-4B)**

JAPANESE JUNIPER

Rigid, spreading, thick mat with ascending branchlets. 1-2 ft. Bluish-green. Bonsai candidate. KE, 8.

***Juniperus procumbens* 'Nana' (4)**

Dwarf form of the preceding. Choice. Bonsai candidate. Plants vary, some being more tightly knit than others. Material sold in the trade as *J. squamata* 'Prostrata' is usually *J. procumbens* 'Nana'. The true *J. squamata* 'Prostrata', a different plant with branchlets nodding at the tips, is seldom encountered in American gardens. CL, CU, FX, GR, HR, KE, LA, ME, OL, SR, WN, 3, 5, 6, 7, 14, 20, 25, 26.*

Juniperus sabina 'Arcadia' (4)

Dense spreading form to about 1½ ft. high. Light green. DB, WN, 6, 19, 20.

Juniperus sabina tamariscifolia (4)

Bright green prostrate shrub to about 2 ft. high. Branchlets partly upright. GI, GR, KE, ME, OL, SR, VA, WA, WU, 2, 3, 6, 7, 10, 16, 19, 20, 23, 26.*

Juniperus squamata 'Blue Star' (4)

Small, more dense version of 'Meyeri' with the same pleasing foliage color. As wide as high. CO, CR, CU, DB, GR, OL, SK, SP, SR, WA, WG, WO, 5, 7, 15, 17, 19, 25, 28.

Juniperus squamata 'Meyeri' (4)

Loose shrub to 4 ft. or more. Irregularly upright. Beautiful steel blue foliage. Best while young. AL, FX, GR, KE, LA, ME, WN, WU, 8, 18, 19.

Juniperus virginiana 'Gray Owl' (4)

Wide-spreading shrub to 4 ft. tall. Habit similar to Pfitzer juniper. Silvery gray. CL, GI, GR, ME, PO, WN, 2, 6, 19.

Spruce

Picea abies (excelsa) 'Clanbrassiliana' (3)

Dense flat-topped bush with crowded branches. To about 6 ft. in old age. Bright green. Prominent reddish-brown buds. CO, WA, WN, 18, 25, 28, 29.

Picea abies 'Echiniformis' (3)

Dense cushion to 2-3 ft. Crowded branchlets and small sharp needles. Light green. CO, KE, SK, 28, 29.

Picea abies 'Gregoryana' (3)

Dense globe or cushion to about 2 ft. Irregular with age. Grayish-green. CO, KE, KT, SP, 28.

Picea abies 'Maxwellii' (3)

Dense, more-or-less flat cushion to 3-4 ft. Bright green. If strong shoots with large needles appear, they should be cut out. BY, CL, CO, DA, HR, KE, KT, OL, SP, WN, 28, 29.

Picea abies 'Nidiformis' (3)

BIRD'S NEST SPRUCE

To about 3½ ft. While young, the branches are arranged to form a flattened depression, somewhat resembling a bird's nest. BY, CL, CO, CU, HR, KE, KT, ME, OL, WG, WU, 5, 6, 14, 17, 19, 25, 26, 28.*

Picea abies 'Procumbens' (3)

Dense bush to 3-4 ft. and up to three times as broad as tall. Horizontal branching with exceptionally long needles for a dwarf form. Light green. AL, BY, CO, GR, KE, KT, OL, 28.

Picea abies 'Pumila' (3)

Low, spreading; to 3 ft., and broader than tall. Soft needles. AL, CR, DB, GR, HR,

KE, KT, OL, SP, TW, WA, 5, 28.

Picea abies 'Reflexa' (3)

Branches long, spreading, pendulous. Allow to cascade, or train stem upward. CO, DI, KT, SP, 28, 29.

Picea abies 'Remontii' (3)

Dense conical shape; to about 6 ft. Bright green. Brown buds conspicuous in winter. CO, FX, GR, HR, KT, WN, 19, 28.

Picea abies 'Repens' (3)

Prostrate or spreading form to about 1½ ft. tall. Dense branches rest flat on each other. Light green. AL, BY, CO, DA, DB, GR, KT, ME, OL, SR, WA, WG, WN, 5, 7, 19, 28, 29.

Picea abies 'Tabuliformis' (3)

Low mat with horizontal branching. Flat-topped. To 2½-3 ft. tall. Light green. DB, KT, PO, SP, 19, 28, 29.

Picea glauca 'Conica' (3)

DWARF ALBERTA SPRUCE

Dense symmetrical cone; after many years to about 10 ft., with a spread of 4-5 ft. Very formal. AL, BY, CL, CU, DI, FX, HR, KE, WG, WN, 3, 5, 6, 7, 16, 18, 19, 25, 28.*

Picea orientalis 'Gowdy' (5)

Vigorous upright form, in time making a small tree. Small needles. CL, CO, DI, FX, KT, TW, 28.

Picea orientalis 'Skylands' ('Compacta Aurea') (5)

Compact grower, with small golden needles. Needs stem-training if it is to be upright. CO, DI, FX, KT, TW.

Picea pungens 'Glauca Prostrata' (3)

Handsome wide-spreading, prostrate form of Colorado blue spruce. Should a leader form, it may be cut out to preserve the prostrate habit. CL, CO, KE, KT, SP.

Picea pungens 'Globosa' ('Glauca Globosa') (3)

Somewhat flat-topped globe form of Colorado blue spruce. To about 4 ft. CL, CO, DI, FX, GR, KE, KT, OL, SP, WN, WO, 5, 6, 17, 25, 28.

Picea pungens 'Montgomery' (3)

Dense spruce to 5-6 ft. high. Broad. Blue. CO, DB, FX, GR, HR, KE, KT, ME, SP, SR, TW, WA, WN, WO, 5, 7, 14, 19, 26, 28.

Pine

Pinus aristata (5)

BRISTLECONE PINE

A dense, very slow-growing low shrub when grown in the East. Sometimes a small tree in western gardens. BR, CL, FO, FX, GI, GR, KE, KT, MU, OL, SR, WG, WN, YE, 2, 6, 9, 17, 18, 26.

Pinus densiflora 'Pendula' (4-3B)

Pendulous, more-or-less prostrate form. Stake

while young for best effect. CL, CO, FX, GI, KE, KT, OL, SP, SS, WA, WN, 7, 14, 25.

Pinus densiflora 'Umbraculifera' (4-3B)

TANYOSHO PINE (See page 22.)

Pinus mugo var. mugo (mughus) (3)

MUGHO PINE

Slow-growing shrub to 8 ft. or more, as broad as tall. Pinch new shoots or "candles" while young to make a dense compact plant. Variable. BR, BU, CL, GI, KE, MI, MU, SR, WA, WB, WN, 3, 5, 10, 17, 18, 22, 23, 25.*

Pinus mugo pumilio (3)

A more-or-less prostrate variety of mughos pine. Lower growing and more dense than the preceding. Deep green. BR, BY, HR, OL, PO, WA, 2, 6, 10, 19.

Pinus pumila (4)

DWARF SIBERIAN PINE

Compact five-needle pine similar to a *Pinus strobus* dwarf and sometimes confused with it. Usually broader than tall. Blue-green cast. AL, CL, GI, KE, KT, OL, SP, 14, 28, 29.

Pinus strobus 'Nana' (3)

DWARF WHITE PINE

Broad dense bush to 4-6 ft. Bluish-green. CO, DI, FX, GI, GR, KE, KT, OL, SP, SR, TW, WA, WN, 5, 6, 17, 18, 26, 28, 29.*

Pinus strobus 'Umbraculifera' (3)

Broad dome-shaped shrub with short trunk. Leaf clusters drooping. Ultimately to 10-12 ft. CL, CO, KE, SP, TW, 28, 29.

Pinus sylvestris 'Beauvronensis' (3)

A Scots pine form that is a densely branched little mound. Perhaps to 2 ft. and a little broader. Leaves slightly twisted. CO, FX, KT, OL, SP, WN, 5.

Pinus sylvestris 'Saxatilis' (3)

Dense, prostrate shrub with a flattened top. CO, KT, OL, SP, 7.

Oriental Arbor-vitae

Platycladus orientalis 'Aurea Nana' (6)

Oval shape; height about 5 ft. Golden yellow in spring. Often called "Berckmans arbor-vitae" in the trade. Usually listed under *Thuja orientalis* in catalogs. DA, HO, KE, LA, ME, SR, WA, WB, 3, 10, 11, 16, 18, 19, 20, 23, 26, 30.

Yew

Taxus baccata 'Adpressa Fowle' (5)

Dense shrub, very slow-growing to about 5 ft. and broader than tall. Very short needles. Distinctive. DB, DI, KT, OL, SP, WN, 29.

Taxus baccata 'Adpressa Stricta' (6)

Columnar form to 10-12 ft. Short horizontal branches. CL, KE.

Taxus baccata 'Repandens' (5)

WEEPING ENGLISH YEW

Shrub to about 3 ft. high and 6 ft. wide. Branches sweep the ground. Relatively long needles. Deep green. Attractive loose ground cover on a shady bank. DA, DB, GI, KE, SR, WB, 2, 8, 18, 19, 22.

Taxus cuspidata 'Densa' (4)

Dense cushion, growing slowly to 4 ft. high and twice as broad. One of the best forms of Japanese yew. CL, KE.

Taxus cuspidata nana (4)

DWARF JAPANESE YEW

A low, dense, wide-spreading shrub for many years, but ultimately reaching 8 ft. or more, and twice as broad. Short bright green needles. AL, DA, GR, KE, KT, WA, WN, 2, 6, 8, 19.

Note: Many other forms of Japanese yew and hybrid yew (*T. media*) exist in the trade. Virtually every general nursery in colder parts of the country stocks at least several forms. Should it not be possible to obtain these plants locally, most of the firms cited in this Handbook will be able to supply them.

Arbor-vitae

Thuja occidentalis 'Ellwangeriana Aurea' (3)

A tight pyramid to about 6 ft. Golden foliage. AL, BO, DB, GR, KT, OL, SR, WN, 7.

Thuja occidentalis 'Emerald' ('Emerald Green') ('Smaragd') (3)

Resembles a dwarf Alberta spruce in form. Good green foliage in winter. FO, FX, GR, SP, 5, 6, 19, 26, 29.

Thuja occidentalis 'Globosa' (3)

Compact globe form to 5-6 ft., somewhat broader. Bright green. DA, EI, HO, KL, 3, 18.

Thuja occidentalis 'Hetz Midget' (3)

Very slow-growing, globe-shaped shrub; 2-2½ ft. after many years. BY, DB, FX, GI, GR, HR, KE, KT, ME, PL, SP, VA, WA, WN, 2, 5, 7, 19.

Thuja occidentalis 'Holmstrup' (3)

Irregular but tight, upright, to 4-5 ft. in 12-15 years. KT, OL, PO, SR, WA, 6, 17, 29.

Thuja occidentalis 'Sudworth' (3)

Dwarf yellow. KT, WA, 25, 29.

Thuja occidentalis 'Woodwardii' (3)

Dense globe form, spreading with age. Old shrubs may attain 6 ft. or more. Green winter and summer. CR, GI, ME, MU, WN, 6, 11, 19, 22, 23, 26, 29.

Thuja orientalis 'Aurea Nana'. See *Platycladus*.

Thuja plicata 'Cuprea' (5)

Low, conical shrub, perhaps to 3 ft. after many years. Young foliage is bright gold. GR, HR, KE, KT, SP, 19.

***Thuja plicata* 'Rogersii' (5)**

Densely compact pyramid to about 4 ft. More-or-less oval or globe-shaped while young. Golden yellow. DB, FX, GR, HR, KE, PL, SP, WA, 19.

Hiba Arbor-vitae***Thujaopsis dolabrata* 'Nana' (6)**

Densely bushy, somewhat spreading to 3-4 ft. Foliage resembles *Thuja*, but is more flattened. Shiny bright green. AL, CU, DB, FX, GR, SP, WA, 19.

Hemlock***Tsuga canadensis* 'Bennett' (4)**

Spreading form with weeping branch tips. To about 3½ ft., and broader than tall. Like a Sargent weeping hemlock in miniature, and better suited for the small garden. AL, CO, KE, KT, ME, SP, SR, TW, WA, WO, 19, 29.

***Tsuga canadensis* 'Cole's Prostrate' (4)**

The most prostrate form, just a few inches high, although with age it becomes somewhat mounded. Sometimes staked and allowed to droop, resembling a diminutive Sargent

weeping hemlock. Usually performs best in part shade. AL, CL, CO, DI, FX, KE, KT, SK, SP, SR, WA, 7, 14, 19, 28, 29.

***Tsuga canadensis* 'Horsford Dwarf' (4)**

Symmetrical globe to 1 ft. or slightly more. Short, closely set needles. CO, KE, SP, 19.

***Tsuga canadensis* 'Hussii' (4)**

Upright shrub to about 3½ ft. Short, interestingly asymmetrical branches. BY, CO, FX, GR, KE, OL, SP, SR, TW, WA, WN, 19, 28, 29.

***Tsuga canadensis* 'Jervis' ('Nearing') (4)**

Compact, somewhat irregular pyramid with ascending branches. To about 2½ ft. AL, CO, CU, DI, FX, KE, KT, OL, SP, 14, 28, 29.

***Tsuga canadensis* 'Minima' ('Bennett') (4)**

Dense globe with short needles. 2-3 ft. CL, FX, GR, KT, OL, SP, 28.

***Tsuga canadensis* 'Minuta' (4)**

An irregular globe, as wide as it is high. Very slow-growing to about 1 ft. CO, KT, SP, TW.

Tsuga canadensis pendula

SARGENT WEEPING HEMLOCK (See page 24.)

Importing Nursery Stock From Overseas

Gardeners in the U.S. and Canada may order plants from overseas nurseries, although obviously there is some risk involved. The plants must enter in bare-root condition, although certain packing materials such as sphagnum moss are permitted. Also the plants may be in transit for a long period, depending on method of transportation, point of origin and plants' final destination. There are authorized inspection stations at Kennedy International Airport, New York, and at Hoboken, N.J. Other stations are at Miami, Fla.; New Orleans, La.; Brownsville, El Paso and Laredo, Texas; Nogales, Arizona; San Francisco, San Diego (San Ysidro) and Inglewood, California; Seattle, Wash.; San Juan, Puerto Rico; and Honolulu, Hawaii. The gardener should be sure that the overseas nursery is willing to ship, then request an PPQ Form 587, "Application To Import Plants or Plant Products", by writing to Plant Protection and Quarantine (PPQ), Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture, Permit Unit, Federal Building, Hyattsville, Maryland 20782, or by telephoning 301-436-8645. Providing the requested plant material is admissible, an import permit will be issued and sent to the importer. If the method of shipment is to be air mail or air parcel post, green-and-yellow mailing labels, with instructions on the back of each label, for forwarding to the shipper, will be included with the permit. Canadians who wish to import plants should write to the Plant Protection Division, Dept. of Agriculture, Ottawa, Ontario K1A 0C5. Importing plants from Canada (or from the U.S. to Canada) is generally less complicated; information can be obtained from the U.S. and Canadian addresses given above. For U.S. gardeners a brochure "Shipping Foreign Plants Home" gives additional permit information as well as plant buying and handling tips. Single copies can be obtained from Information Division, APHIS, U.S. Dept. of Agriculture, 26 Federal Plaza, Room 1653, New York, NY 10007.

RETAIL NURSERY SOURCES

Retail nurseries, including those with mixed retail-wholesale operations, are given **letter codes**. Exclusively wholesale nurseries, designated by **number codes**, are listed separately. *If you are not a nurseryman, please do not order directly from wholesale firms.* In the few instances where only wholesale sources have been given for plants, ask your local nurseryman or garden center to order them for you from the particular wholesale firm. All firms listed will ship unless otherwise noted.

- AE Alberta Nurseries & Seeds, Ltd., Bowden, Alberta, Canada T0M 0K0. 403-224-3362. General nursery stock shipped only in Canada. Vegetable and flower seeds. Mail-order catalog.
- AL Alpenglow Gardens, 13328 King George Hwy., Surrey, BC, Canada V3T 2T6. 604-584-9392. Rock garden plants, dwarf conifers. Catalog \$1.00.
- Armstrong Nurseries, Box 4060, Ontario, CA 91761. 714-984-1211. Retail and wholesale. Hybrid tea and other roses, fruit trees. Mail-order catalog.
- BO The Bovees Nursery, 1737 S.W. Coronado, Portland, OR 97219. 503-244-9341. Uncommon rhododendron and azalea species and hybrids. Catalog 50¢. Closed Monday and Tuesday.
- BR Brooks Tree Farm, 9785 Portland Rd., N.E., Salem, OR 97305. 503-393-6300. Conifers, deciduous trees and shrubs in small sizes. Pre-bonsai.
- Bunting's Nurseries, Selbyville, DE 19975. 302-436-8231. Retail and wholesale. Strawberries, fruit and nut trees, berry plants and ornamentals. Mail-order catalog.
- BU W. Atlee Burpee Co., 300 Park Ave., Warminster, PA 18974. 215-674-4900. Branches in Clinton, Iowa and Riverside, California. Retail and wholesale. Vegetable and flower seeds, general nursery stock. Trees and shrubs sold retail. Mail-order catalog.
- BY Busse Gardens, Box 13, 635 E. 7th St., Cokoto, MN 55321. 612-286-2654. Dwarf shrubs, perennials, wildflowers, rock plants. Mail-order catalog \$1.00.
- CA California Nursery Co., Box 2278, Fremont, CA 94536. 415-797-3311. Retail and wholesale. Mainly fruit and nut trees. General catalog. Ships retail.
- CG Carlson's Gardens, Box 305, South Salem, NY 10590. 914-763-5958. Azaleas and rhododendrons. Mail-order catalog \$2.00.
- CL Carroll Gardens, Box 310, 444 E. Main St., Westminster, MD 21157. 301-848-5422. Retail and wholesale. Dwarf evergreens, trees and shrubs, roses, perennials, herbs and ground covers. Mail-order catalog.
- CO Coenosium Gardens, 425 N. Fifth St., Lehigh, PA 18235. 215-377-1495 (evenings), 717-386-4201 (days). By appointment. Retail only. Dwarf conifers, unusual trees. Two stamps for list.
- CR Corliss Bros. Nursery and Garden Center, 31 Essex Rd., Ipswich, MA 01938. 617-356-5422. Mainly retail. General nursery stock. Catalog. No shipping.
- CU The Cummins Garden, 22 Roberts-ville Rd., Marlboro, NJ 07446. 201-536-2591. By appointment. Mainly retail. Azaleas, rhododendrons, dwarf evergreens, companion plants. Mail-order catalog \$1.00.

- DA Dauber's Nurseries, Rear 1705 N. George St., Box 1746, York, PA 17405. 717-848-6088. Retail and wholesale. Garden Center. Uncommon trees and shrubs, often landscape size. Hollies. Ships. Catalog 20¢.
- DB Daystar, Litchfield-Hallowell Rd., RFD 2, Litchfield, ME 04350. 207-724-3369. Formerly called The Rock Garden. By appointment. Dwarf shrubs, heaths, miniature roses, rock plants. Mail-order catalog \$1.00.
- Sam Dible Nursery, RFD 3, Box 86, Shelata, PA 15774. 412-726-5377. Retail and wholesale. Evergreens for Christmas tree plantings, reforestation.
- DI Dilatush Nursery, 780 Route 130, Robbinsville, NJ 08691. 609-585-5387. Dwarf evergreens, uncommon trees and shrubs. Landscape sizes. In summer call before coming. No shipping.
- DU Dutch Mountain Nursery, 7984 N. 48th St., Rte. 1, Augusta, MI 49012. 616-731-5232. Trees, shrubs and vines for wildlife purposes. Mail-order list 25¢.
- EA Eastville Plantation, Box 337, Bogart, GA 30622. 404-548-2530. Fruit trees and shrubs, some ornamentals. Mail-order catalog.
- EI Eisler Nurseries, 219 E. Pearl St., Box 70, Butler, PA 16001. 412-287-3703. General nursery stock with emphasis on landscape size. Retail catalog, with price adjustment for trade customers. No mail-order shipping.
- Emlong Nurseries, 2671 W. Marquette Woods Rd., Stevensville, MI 49127. 616-429-3431. Retail, limited wholesale. Fruit trees, general nursery stock. Mail-order catalog.
- Farmer Seed and Nursery, 818 NW 4th St., Faribault, MN 55021. 507-334-2017. Vegetable and flower seeds. General nursery stock. Catalog.
- FI Henry Field Seed and Nursery Co., 407 Sycamore St., Shenandoah, IA 51602. 712-245-2110. Mainly retail. General nursery stock. Mail-order catalog.
- FO Forestfarm, 990 Tetherath, Williams, OR 97544. Small size trees and shrubs, western natives, dye plants. Unusual selection. Mail-order catalog \$1.00.
- FX Foxborough Nursery, 3611 Miller Rd., Street, MD 21154. 301-836-1872. Dwarf evergreens, uncommon trees. List 50¢.
- GA Gardens of the Blue Ridge, Box 10, Pineola, NC 28662. 704-733-2417. Mainly retail. Native trees and shrubs, wildflowers. Catalog \$2.00.
- D.S. George Nurseries, 2491 Penfield Rd., Fairport, NY 14450. 716-377-0731. Retail and wholesale. Clematis. Retail customers are requested to send SASE for brochure.
- GI Girard Nurseries, Box 428, Geneva, OH 44041. 216-466-2881. Dwarf and unusual evergreens, azaleas, uncommon trees. Pre-bonsai. Conifer seeds. Mail-order catalog.
- GO Gossler Farms Nursery, 1200 Weaver Rd., Springfield, OR 97477. 503-746-3922. By appointment. Uncommon woody plants, especially magnolias. Retail mail-order catalog \$1.00, wholesale catalog available to the trade.
- GR Greer Gardens, 1280 Goodpasture Island Rd., Eugene, OR 97401. 503-686-8366. Rhododendrons, azaleas, dwarf conifers, Japanese maples, pre-bonsai. Catalog \$2.00.
- GU Gurney Seed & Nursery Co., Yankton, SD 57078. 605-665-4451. Vegetable and flower seeds. Trees and shrubs for the Plains. Perennials, garden supplies. Mail-order catalog.
- Hastings, 434 Marietta St. NW, Box 4274, Atlanta, GA 30302. 404-524-8861. Retail and wholesale. Fruit and nut trees, kiwi. Vegetable seeds. Catalog.

- HE Marc Henny Nursery, 10415 - 72nd Ave. NE, Brooks, OR 97305. 503-792-3448. Azaleas, daphnes. Retail, wholesale.
- Hillier Nurseries (Winchester) Ltd., Ampfield House, Ampfield, Romsey, Hants, SO5 9PA, England. The largest selection of woody plants grown anywhere by a commercial firm. Price list air mail \$5.00. (Hillier's Manual of Trees and Shrubs, £7.00 soft cover surface mail, is a valuable reference for descriptions of uncommon plants.) Import permit needed (see page 78).
- HO C. M. Hobbs & Sons, 9300 W. Washington St., Box 31227, Indianapolis, IN 46231. 317-241-9253. General nursery stock. Catalog \$1.50, no mail-order.
- HR Hortica Gardens, Box 308, Placerville, CA 95667. 916-622-7089. By appointment. Retail, wholesale. Azaleas, Japanese maples, conifers, pre-bonsai stock. Catalog 50¢.
- HU Hughes Nursery, 1305 Wynooche W., Montesano, WA 98563. Japanese maples, other species. Dwarf conifers. List \$1.00.
- IN Inter-State Nurseries. Hamburg, IA 51644. 800-831-4104. General nursery stock, fruit trees, perennials. Mail-order catalog.
- Jackson & Perkins Co., Box 83A, Medford, OR 97501. 503-776-2000. Mostly retail, wholesale for roses only. Roses, bulbs, dwarf fruit trees, some vegetables. Catalog.
- JU Jung Seed Co., 335 S. High St., Randolph, WI 53956. 414-326-3121. General nursery stock. Mail-order catalog.
- KE Keil Bros., 220-15 Horace Harding Blvd., Bayside, NY 11364. 212-229-5042. Dwarf plants, heaths and heathers, rock garden plants, general and unusual nursery stock. Does not ship.
- KL Kelly Bros. Nurseries, Dansville, NY 14437. 716-335-2211. Retail and wholesale. General nursery stock, fruit and nut trees, bulbs. Mail-order catalog.
- KR Krider Nurseries, Box 29, Middlebury, IN 46540. 219-825-5714. General ornamentals and fruit trees. Mail-order catalog.
- KT Michael A. & Janet L. Kristick, RD 1, Mockingbird Rd., Wellsville, PA 17365. 717-292-2962. By appointment. Dwarf conifers, Japanese maples. Mail-order list.
- LA Lamb Nurseries, E. 101 Sharp Ave., Spokane, WA 99202. 509-328-7956. Dwarf shrubs, rock garden plants, perennials, ground covers, hardy succulents. Mail-order catalog.
- H. L. Larson, 3656 Bridgeport Way West, Tacoma, WA 98466. 206-564-1488. Seeds of uncommon rhododendron species. No plants shipped. List.
- A. M. Leonard, Inc., 6665 Spiker Rd., Piqua, OH 45356. 513-773-2694. Gardening and pruning tools. Extensive catalog.
- Henry Leuthardt Nurseries, Montauk Hwy., Box 666, East Moriches, NY 11940. 516-878-1387. Dwarf and espaliered fruit trees. Small fruits.
- LO Louisiana Nursery, Rte. 7, Box 43, Opelousas, LA 70570. 318-948-3696. Magnolias in variety, uncommon ornamental trees and shrubs. Fruit trees and perennials. Mail-order catalog \$2.00.
- Maplewood Seed Co., 6219 S.W. Dawn St., Lake Oswego, OR 97034. Seeds of Japanese and other maples. List 20¢.
- MA Matsu-Momiji Nursery, Box 11414, 410 Borbeck St., Philadelphia, PA 10111. 215-722-6286. By appointment. Extensive list of Japanese maple cultivars in small sizes; also Japanese black pines. Mail-order list 50¢.

- MB May Nursery Co., Box 1312 Yakima, WA 98907. 509-453-8219. Fruit and nut trees. Retail and wholesale.
- MC Earl May Seed & Nursery Co., Shenandoah, IA 51603. 712-246-1020. General nursery stock. Mail-order catalog.
- ME Mellinger's, 2310 W. South Range Rd., North Lima, OH 44452. 216-549-9861. Retail and wholesale. Extensive variety of trees and shrubs in small sizes. Bonsai containers. Tree seeds. Unusually large list of garden supplies and tools. Reference books. Mail-order catalog.
- MI J. E. Miller Nurseries, Canandaigua, NY 14424. In NY State 800-462-9601, outside 800-828-9630. Fruit trees, including old varieties, berry plants, some ornamental trees and shrubs. Mail-order catalog.
- MU Musser Forests, Box 340, Indiana, PA 15701. 412-465-5686. Retail and wholesale. Conifers in quantity units for Christmas tree plantings and reforestation. Others, including rhododendrons. Mail-order catalog.
- NU Nuccio's Nurseries, 3555 Chaney Trail, Box H, Altadena, CA 91001. 213-794-3383. Extensive camellia listing. Azaleas. Closed Wednesday and Thursday. Catalog.
- OL Oliver Nurseries, 1159 Bronson Rd., Fairfield, CT 06430. 203-259-5609. Dwarf conifers and rock garden plants. Rhododendrons. Uncommon trees. Pre-bonsai plants. Catalog \$1.00. Does not ship.
- PA Panfield Nurseries, 322 Southdown Rd., Huntington, NY 11743. 516-427-9112. Wholesale branch at Ceram Rd., Mt. Sinai, 516-473-9170. Retail (no shipping) and wholesale. Trees and shrubs, native plants, perennials. Separate lists.
- PL Plumfield's Garden Center, Box 410, 735 W. 23rd St., Fremont, NE 68025. 402-721-3520. (Wholesale division: Plumfield Nurseries, same mailing address, 402-721-3622.) General nursery stock. Separate retail and wholesale lists.
- PO Powell's Gardens, Rte. 2, Hwy. 70, Princeton, NC 27569. 919-936-4421. Dwarf evergreens, perennials, rock plants. Mail-order catalog \$1.50.
- Orlando S. Pride Nurseries, 145 Weckerly Rd., Butler, PA 16001. 412-283-0962. Basically retail. Hollies, azaleas, rhododendrons. List 50¢. Only small sizes shipped.
- Rayner Bros., Box 1617, Salisbury, MD 21801. 301-742-1594. Fruit and nut trees, strawberries, other berry plants. Mail-order catalog.
- Roses of Yesterday and Today, 802 Brown's Valley Rd., Watsonville, CA 95076. 408-724-3537. Old, rare and unusual roses. Catalog \$2.00.
- SA Salter Tree Farm, Rte. 2, Box 1332, Madison, FL 32340. 904-973-6312. Retail and wholesale. Trees and shrubs of the Deep South, including native azaleas. Unusual selection. Mail-order list.
- SH A. Shammarello & Son Nursery, 4508 Monticello Blvd., South Euclid, OH 44143. 216-381-2510. Azaleas and rhododendrons. Mail-order catalog.
- SI The Shop in the Sierras, Box 1, Midpines, CA 95345. 209-966-3867. Western native trees and shrubs. Catalog \$1.00.
- SK Siskiyou Rare Plant Nursery, 2825 Cummings Rd., Medford, OR 97501. 503-772-6846. Dwarf shrubs, rare alpine plants. Catalog \$1.00.
- SP Joel W. Spingarn, 1535 Forest Ave., Baldwin, NY 11510. 516-623-7810. By appointment. Extensive selection of dwarf conifers. Japanese maples, rock garden rhododendrons. Mail-order catalog \$1.00.

- SR Sprainbrook Nursery, 448 Underhill Rd., Scarsdale, NY 10583. 914-723-2382. Mainly retail. No shipping. Catalog. Wide range of general nursery stock.
- SS Spruce Brook Nursery, Rte. 118, Box 925, Litchfield, CT 06759. 203-482-5229. Retail and wholesale. General nursery stock. Catalog \$2.00. No shipping.
- ST Stark Bro's. Nurseries, Louisiana, MO 63353. 800-325-4180. Large selection of fruit trees. Ornamental shrubs and trees. Mail-order catalog.
- Tall Timber, 4520 Lariat Dr., Castle Rock, CO 80104. 303-688-3664. Pre-bonsai conifers and others. Catalog \$1.00, refundable on first order.
- TH Thomasville Nurseries, Box 7, Thomasville, GA 31792. 912-226-5568. Retail, limited wholesale. Roses, azaleas, day-lilies, liriopes. Mail-order catalog.
- TW Twin Peak Nursery, Box 196, Oceanside, NY 11572. Dwarf evergreens, rock plants, miniature roses. Mail-order catalog \$1.00.
- VA Valley Nursery, Box 4845, Helena, MT 59601. 406-442-8460. Retail and wholesale. Uncommon trees and shrubs for cold climates. Plant list.
- WA Washington Evergreen Nursery, Box 125, South Salem, NY 10590. 914-763-5072. Dwarfs and companion plants. Pre-bonsai. Mail-order catalog \$1.00.
- WB Waynesboro Nurseries, Rte. 664, Box 987, Waynesboro, VA 22980. 703-942-4141. Retail and wholesale. General nursery stock, fruit trees, berry plants. Large trees available at nursery. Mail-order catalog.
- WG Wayside Gardens, Hodges, SC 29695. 803-374-3387. Wide range of shrubs, vines, perennials. Catalog.
- WN Weston Nurseries, E. Main St., (Rte. 135), Box 186, Hopkinton, MA 01748. 617-435-3414; from Greater Boston: 235-3431. Retail and wholesale. General nursery stock, perennials, rock garden plants. Landscape-size specimens. Catalog. Does not ship but will deliver in Boston area.
- WO White Flower Farm, Rte. 63, Litchfield, CT 06759. 203-567-0801. Perennials, bulbs, uncommon trees and shrubs. Yearly catalog subscription \$5.00, with credit on purchase.
- WT Winterthur Plant Shop, Winterthur Museum and Gardens, Winterthur, DE 19735. Less common shrubs and trees. Catalog \$1.00.
- WU Woodland Nurseries, 2151 Camilla Rd., Mississauga, Ontario, Canada L5A 2K1. 416-277-2961. Small trees and shrubs, especially rhododendrons and azaleas. Lilacs. Retail list \$1.00, wholesale list free to the trade.
- WX Woodlanders, 1128 Colleton Ave., Aiken, SC 29801. 803-648-7522. By appointment. Plants of the southern piedmont and coastal plain. Mail-order catalog \$1.50, price list for SASE.
- YE Yerba Buena Nursery, 19500 Skyline Blvd., Woodside, CA 94062. 415-851-1668. Retail and wholesale. California native plants. Plant list.

WHOLESALE NURSERIES

The following firms are not equipped to deal directly with the gardening public, except where noted. *This list is primarily for nurserymen.* If you desire a plant that is available only from a wholesale source, please ask your local nurseryman to order it for you.

- 1 American Holly Products, Box 754, Rte. 49, Millville, NJ 08332. 609-825-4959. Other hollies, too. Catalog.
- 2 Appalachian Nurseries, Box 87, Waynesboro, PA 17268. 717-762-4733. Lining out stock of uncommon shrubs and trees. Azaleas and rhododendrons. Catalog.
- 3 Bissett Nursery Corp., 1121 Waverly Ave., Holtsville, NY 11742. 516-732-9142. General nursery stock.
- 4 Bosley Nurseries, 9579 Mentor Ave., Mentor, OH 44060. 216-352-3308. Exbury azaleas, rhododendrons, pieris, holly.
- 5 Conard-Pyle Co., West Grove, PA 19390. 215-869-8011. Roses, trees and shrubs. Catalog to the trade only.
- 6 John Connon Nurseries, Box 200, Waterdown, Ontario, Canada L0R 2H0. 416-689-6681. General nursery stock.
- 7 Environmentals, James E. Cross, Box 730, Cutchogue, NY 11935. 516-734-6439. Box huckleberry and other dwarf broadleaf evergreens. Dwarf conifers, container stock. Does not ship.
- 8 Charles Fiore Nurseries, Box 67, 17010 W. Hwy. 22, Prairie View, IL 60069. 312-634-3400. Trees and shrubs, mainly of landscape size.
- 9 Flickingers' Nursery, Sagamore, PA 16250. 412-783-6528. Christmas tree seedlings.
- 10 Forest Hills Nurseries, 310 Knollwood Ave., Cranston, RI 02910. 401-944-8282. General nursery stock.
- 11 Forest Nursery Co., Rte. 2, Box 118-A, McMinnville, TN 37110. 615-473-2133. Ornamental trees and shrubs, fruit trees. Large trees available at nursery. Catalog to the trade only.
- 12 Gilmore Plant & Bulb Co., Box 8, Julian, NC 27283. 919-685-4451. Mainly wholesale, some retail. General nursery stock. Broadleaf evergreens, fruit trees. Wholesale catalog only.
- 13 Calvin Harman Nursery, Stovall, GA 30283. 404-884-8838. Rooted cuttings and liners of evergreen shrubs, including hollies.
- 14 Hess' Nurseries, Rte. 553, Box 326, Cedarville, NJ 08311. 609-447-4213. Seedlings of uncommon trees and shrubs. Grafts of hard-to-find conifers.
- 15 Hollandia Nursery Co., 10725 39th Ave. N.E., Seattle, WA 98125. 206-363-6080. Uncommon trees and shrubs. B & B and container stock.
- 16 Ingleside Plantation Nurseries, Box 1038, Oak Grove, VA 22443. 804-224-7111. General nursery stock, broadleaf evergreens. Catalog \$2.00, available only to the trade.
- Kester's Wild Game Food Nurseries, Box V, Omro, WI 54963. 414-685-2929. Mainly aquatics. Catalog \$2.00.
- 17 Charles Klehm & Son Nursery, Whole-

- sale Div., 2 E. Algonquin Rd., Arlington Heights, IL 60005. 312-437-2888. Trees and shrubs. Landscape size specimens.
- Le-Mac Nurseries, Box 268, Hampton, VA 23669. 804-723-3313. Rhododendrons and azaleas.
- 18 Baier Lustgarten Farms & Nurseries, Rte. 25, Middle Island, NY 11953. 516-924-3444. (Branches in Cream Ridge, NJ; Shelter Island, NY and Miami, FL.) Extensive list of shrubs and trees. Specimen material.
 - 19 Mitsch Nursery, 6652 S. Lone Elder Rd., Aurora, OR 97002. 503-266-9652. Lining out stock of conifers, heaths, azaleas, rhododendrons and other broadleaf evergreens. Wide selection.
 - 20 Monrovia Nursery Co., Box Q, 18331 E. Foothill Blvd., Azusa, CA 91702. 213-334-9321. Unusually wide range of general nursery stock for moderate and mild climates. Container stock, also smaller sizes. Catalog \$10.00, to the trade only.
 - 21 Mount Arbor Nurseries, Shenandoah, IA 51601. 800-831-4125. General nursery stock, roses, perennials. Catalog \$4.95.

Mountain Home Nurseries, De Borgia, MT 59830. 406-678-4221. Christmas tree seedlings.
 - 22 Princeton Nurseries, Box 191, Princeton, NJ 08540. 609-924-1776. General nursery stock, including some specimen sizes. B & B and container stock. Catalog \$2.00, available only to the trade.
 - 23 Scarff's Nursery, 411 Dayton Lakeview Rd., New Carlisle, OH 45344. 513-845-3821. General nursery stock. Primarily wholesale, with two garden centers in Dayton area.
 - 24 Simpson Orchard Co., 1504 Wheatland Rd., Vincennes, IN 47591. 812-882-2441. Hollies, crab-apples, hawthorns.
 - Skylark Wholesale Nursery, 6735 Sonoma Hwy., Santa Rosa, CA 95405. 707-539-1565. Mild-climate trees, shrubs, vines, ground covers.
 - 25 Summer Hill Nursery Co., Summer Hill Rd., Madison, CT 06443. 203-421-3055. General nursery stock, conifers, rhododendrons. B & B and container stock.

Synnestvedt Nursery Co., Burr Oak Nursery Div., 24550 West Hwy. 120, Round Lake, IL 60073. 312-546-4700. General nursery stock, including specimen sizes.
 - 26 Alfred Teufel Nursery, 12345 N.W. Barnes Rd., Portland, OR 97229. 503-646-1111. Branch at 666 134th St., S.W., Everett, WA 98204. 206-743-4444. Evergreens, including hollies. Ornamental trees and shrubs. Ground covers. Horticultural tools and supplies. Catalog \$2.50, to the trade only.

Vans Pines, West Olive, MI 49460. 616-399-1620. Seedlings and transplants of conifers and deciduous trees and shrubs.
 - 27 Van Veen Nursery, Box 06444, 4201 S.E. Franklin St., Portland, OR 97206. 503-777-1734. Large selection of rhododendrons. Catalog.
 - 28 Verkade's Nurseries, 53 Randolph St., Lincoln Park, NJ 07035. 201-694-0304. Nursery and lining out stock of unusual trees and dwarf conifers.
 - 29 John Vermeulen & Son, Neshanic Station, NJ 08853. 201-369-5211. Liners and container stock of uncommon trees and shrubs. Dwarfs, broadleaf evergreens, pre-bonsai.
 - 30 Wight Nurseries, Box 390, Cairo, GA 31728. 912-377-3033. Conifers and broadleaf evergreens, including camellias.

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AN INVITATION TO JOIN AND ENJOY

**A man does not plant a tree for himself;
he plants it for posterity.**

—Alexander Smith

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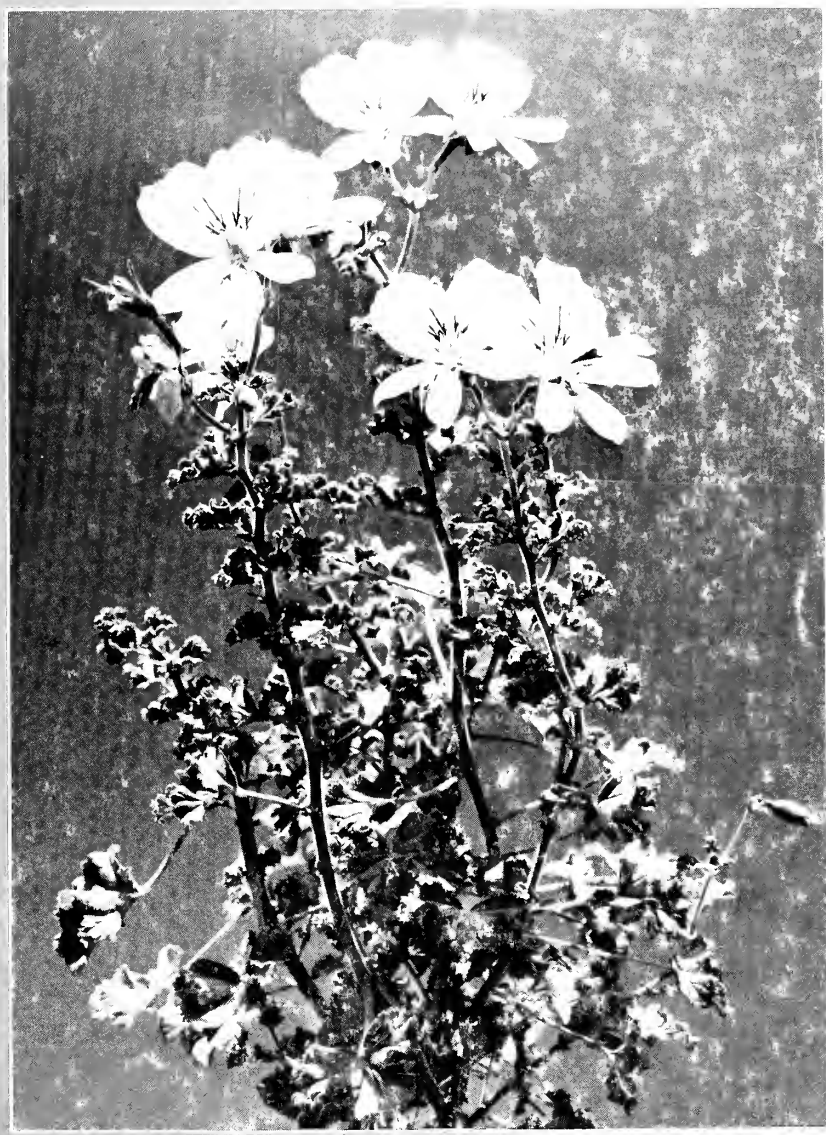
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To Our Members

"Nursery Source Manual," the Autumn 1982 issue of *PLANTS & GARDENS* (Vol. 38, No. 3) is now in production and should be in your hands shortly.

Thank you for your patience.

PLANTS & GARDENS

BROOKLYN BOTANIC GARDEN RECORD

Vol. 38

Winter 1982-83 (March, 1983)

No. 4

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The heavily perfumed swan orchid, (*Cychnoches ventricosum* var. *warszewiczii*) has yellow flowers with white tips and dark green platform.

LETTER FROM THE BROOKLYN BOTANIC GARDEN

As most readers know, the *Winter Plants & Gardens* is devoted largely to a selection of outstanding articles that have appeared in other horticultural publications in the previous twelve months. There are also a few brief reports on plants that have made the news, garden pests and some of the more noteworthy new books. In particular, we would like to thank the various publications and authors for their permission to reprint selected pieces.

One of the keen pleasures of serving as Editor of *Plants & Gardens* has been the opportunity to get to know some of the real leaders in the field of horticulture. Three of them, each a good friend of BBG, have died in recent months—John C. Wister, John M. Fogg, Jr. and Joseph C. McDaniel. Dr. Wister, who edited *Plants & Gardens* briefly in the late 1940's, was a remarkable man, one who was regarded by many as the Dean of American Horticulture. He was the founder of a number of plant societies and possessed a very sharp wit. An interview with him appeared in the Winter 1976-77 P & G. Dr. Wister, upon his ninetyeth birthday a few years ago, received a special card of salutation from the much younger George Taloumis, photographs by whom have appeared frequently in P & G. Dr. Wister wrote back, "Thank you for your card, and I hope to reciprocate when you get to my age."

Jack Fogg was Mr. Botany of Philadelphia, having served as a professor at the University of Pennsylvania for many years. He was also Director of the Morris Arboretum and, "in retirement," Director of the Arboretum of the Barnes Foundation. I recall once asking him a casual question about the flowering stages of an uncommon tree, *Parrotia persica*. He didn't know the answer. Eight years later several slides arrived in my mail, depicting the stages. We hadn't discussed the matter in the interim.

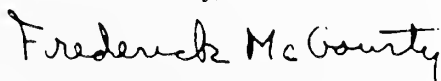
Well known for a book on weed identification that helped a generation of home gardeners, Dr. Fogg was especially kind to young people breaking into the field of horticulture. I remember an encounter with him in Dr. Wister's garden. The three of us were discussing fritillarias and other less common spring bulbs. A cold April rain started to fall, and none of us had raincoats. I was quite ready to retreat to the house at once, but the conversation went on and on. Finally, Dr. Fogg, who was some fifteen years younger than Dr. Wister, suggested that we continue our talk indoors. With mock contempt, Wister turned to him and said, "Who cares if it is raining? We are talking about plants!"

Joe McDaniel, who taught at the University of Illinois, Urbana, was for some years the most prolific knowledgeable horticultural writer in the country. At one time it hardly seemed possible to pick up a garden or trade periodical that did not have an article or letter to the editor by him. A southerner, and a quintessential one at that, he was best known for his advocacy of the magnolia. He was that curious self-taught breed of plantsman, common to the South but rather rare in the North, who knew the countryside of a hundred counties or more like the back of his hand. His imagination was always at work. I recall running into him at a meeting after a pause of a year. Without saying hello, he quickly pressed the fruit of one of the southern buckeyes into my hand and urged me to tell him how it tasted. It was edible, more or less. He said, "We'll have to find a tree with better tasting fruits. This could be a new food source!" Only after this did we exchange the usual pleasantries.

Fourteen years is a long time to serve as editor of any publication, and I think that now is the time to move along to some other projects that are dear to my heart. This is my last P & G. There have been many happy, rewarding moments, and I thank goodness for the patience of readers and contributors. And for the Wisters, Fogs and McDaniels of American horticulture.

Good gardening this spring! Adieu.

Sincerely,



Editor



Japan's many centuries of gardening provide . . .

AN IMPORTANT PLANT HERITAGE

John L. Creech

Reprinted with permission from AMERICAN HORTICULTURIST, December 1982

There is no question that China received plant collectors' greatest attention during the first quarter of the twentieth century, and this interest would have continued were it not for the subsequent political turmoil there. But when one considers the plants in greatest profusion in our gardens and parks, Japan is actually the main contributor. That small island empire is a treasure house of wild and cultivated ornamental plants.

Any observant visitor's first impression of Japan is of its extraordinary wealth of vegetation and the extent to which native plants are cultivated as ornamentals. The number of known native species of trees and other higher plants exceeds five thousand, and these are distributed over some 950 genera. Over ten percent of these species can be found in Japanese nursery catalogs. The

number of cultivated forms of ornamentals is impossible to estimate, but they are legion although this country is smaller than the state of California. While we can find gardens in the eastern United States where as much as seventy percent of the plants used for landscaping are native to Japan, the range of species is exceedingly limited in comparison to Japanese gardens of much smaller size. It's no wonder that many horticulturists believe Japan is where we should direct ornamental plant studies for the future.

The "Natural History" Period

There had been a long period of Chinese influence in the style of gardening prior to 1636, when Japan closed herself off from the rest of the world following tremendous political and social upheaval. Then, during this period of

Japanese nurseries typically have intense cultivation on very small plots. A premium is placed on the quality of the stock and care in training.

isolation, called the "natural history period," the Japanese paid great attention to the study and cultivation of native ornamental plants. The natural wealth of plants available, combined with great intellectual fervor, resulted in a unique "horticultural happening."

For almost 250 years intensive studies were undertaken of the natural plant and animal kingdoms, lasting until the re-establishment of imperial rule in 1867. Learned men delved into the natural products of the country, and medicinal gardens arose in all parts of the empire. The medicinal garden at Azabu in Tokyo, for example, was established in 1661 and was moved to Koishikawa in 1684 to become the basis of the botanical garden of the University of Tokyo. Food plants were not neglected, and numerous studies were conducted on plants of potential use during times

of food scarcity. This, in part, probably accounts for the vast number of native plants still used in the Japanese diet.

Ornamental plants did not escape notice. Great interest developed in the culture of the azalea, camellia, chrysanthemum and iris, as well as the morning-glory, for which the goal was and still is the development of platter-sized flowers. But lesser-known plants also interested these horticulturists—*Rohdea*, *Psilotum*, *Goodyera*, *Dendrobium*, *Adonis*, *Selaginella*—all natives, and for each species special cultural techniques and proper containers were prescribed. Hundreds of selections were introduced at grand exhibitions in the larger cities. The ones held in Kyoto and Tokyo in 1717 displayed over seven hundred varieties of chrysanthemums.

Horticultural publishing was also important. Great and lengthy volumes with wood-block illustrations were not uncommon. An excellent paper prepared in conjunction with the Third Pan-Pacific Science Congress¹¹ in 1926 describes the history of botany in old Japan and identifies some eighty works produced during the natural history period dealing with various botanical, horticultural and related natural product matters—some run-



The tranquility of the Katsura Detached Palace is accomplished by the extraordinary attention devoted to line and texture, as well as meticulous training of the plants.



In the understory of the forests of Honshu a *Schizophragma hydrangeoides* flourishes.

ning into hundreds of volumes. An essay by Bartlett and Shohara¹ elaborates on the development of natural history, especially botany, in Japan and catalogues an exhibition of 111 Japanese books and manuscripts in conjunction with the Hundredth Anniversary (1954) of the First Treaty between the United States and Japan.

The flowering cherry, of course, received special attention. After all, the mountain cherry (*Prunus jamasakura*) had long been considered the national flower, symbolizing the spirit of the Japanese people. Double-flowering cherries were said to have been known a thousand years before, but most of the cultivars arose during the natural history period. Along with the development of new



This magnificent old grove of bamboo in Kyoto typifies Japan's appreciation of this early Chinese introduction.



Every week in Kurume great nursery auctions take place. Here a mature holly is offered for sale.

cultivars came large public and private collections, especially for “cherry viewing.” In a sense these collections became what are genetic resource collections today. A number of natural history period publications appeared on the cultivated flowering cherries with short descriptions and illustrations. In *Kadan Komoku* (1681), forty flowering cherries are mentioned while in an early 18th-century manuscript, *Honzo Hosel*, 167 cultivated varieties appear. An actual floral calendar with seventeen cherries was mentioned in *Kashinpu* (1795). It is unfortunate that so many distinct plants that were produced during this exciting era no longer exist. Even in the instance of those which survived into the twentieth century additional losses continued, so that today it has been necessary for the Japanese to recover some from collections in the United States.

The development of so many new ornamentals from native plants also created new schools of landscape architecture. The great park, Korakuen, started in 1687 by the

feudal lord Ikeda at Okayama, represents a style of landscape architecture that was popular during this period. It was completed in 1700. It is laid out so the visitor can enjoy many vistas. Hillocks, ponds, a waterfall, miniature farm fields, a forest—all artificial—are tastefully arranged. Arbors, islands and alleys are built everywhere. The distant views of the verdant Misaoyama hills are taken in as a borrowed background. It is a typical Japanese garden, rich in scenic beauty and composed almost entirely of native plants. I can think of no other style of landscape architecture that is built on native plants and is of such an enduring nature.

Although Japanese gardens take some of their character from a thousand years of Chinese influence, Chinese plants of an ornamental nature such as the giant bamboos, flowering apricot, peony, nandina were not introduced in great numbers, and when they were established in Japan their foreign origins became so obscure they were thought to be native. What western plants reached Japan were mainly through their Chinese contacts, mostly for herbal use, although the sweet potato was first cultivated in Japan in 1615 by Cocks, Factor of the British East India Company establishment.¹³ That plant soon demonstrated its importance as a food in times of scarcity, the most recent being during WWII.

Prior to Perry's arrival in Japan there appeared to have been no horticultural contacts by Americans despite the fact that our sailing ships touched Japanese shores on numerous occasions from 1790 onward. Our horticultural contacts began in earnest when Perry arrived in 1854. There was an immediate interest in the plants of that strange land, and periodicals such as *Country Gentlemen* frequently reported on trials with new plants in the United States, both pro and con.³ Private individuals, consular officials and professionals hired by the Japanese government sent plants back from Japan at various times. No fewer than sixteen USDA plant collectors

made some kind of contribution of plants between 1898 and 1955. Similarly, nurserymen and collectors from private institutions, often on their way to China, paused to do some collecting in Japan.

Western Plant Collectors

One of the lengthiest stays in Japan before 1900 was that of William S. Clark and colleagues from the University of Massachusetts (Massachusetts Agricultural College). The University was hired by the Government of Japan in 1876 to direct the establishment of a new college in Hokkaido. One or another of their professors stayed until 1893. While Clark was there (1876-77) he sent back at least two shipments of seeds to the college and the Arnold Arboretum, but another person, scarcely known in American horticulture, was active in Japan during the same era. He was Louis Boehmer, a naturalized American who was employed by the Kaitakushi, a development corporation for the pioneering of Hokkaido.² The Kaitakushi was headed up by Horace Capron, U.S. Commissioner of Agriculture, who arrived in Japan in 1871. Boehmer went along as the horticulturist and spent several years collecting plants and herbarium material in Hokkaido. The plants were tested in a garden he developed in Tokyo, and his herbarium specimens were to form the beginnings of the University of Tokyo Herbarium. After his work in Hokkaido was completed, Boehmer stayed in Japan and opened a plant exporting business in Yokohama, where he remained until 1892, exporting plants to his homeland, Germany. Boehmer's beautifully illustrated catalog is really more of a commentary on Japanese plants. A copy of this rare work is in the Rare Book Collection of the Smithsonian Institution Library. Strangely, this twenty-year effort rarely surfaces in reports of foreign horticultural activities in Japan.

Both Fairchild (USDA) and Sargent (Arnold Arboretum) visited Japan and sent back collections, but neither was persuaded that Japan could offer as much as China. Both of "their men in the field," Meyer (USDA) and Wilson (AA), collected in Japan, although neither was as enamored of Japan as he was of China. Japanese plants did not arrive in the United States in the numbers that might have occurred had these leaders of plant explorations been more enthusiastic. When Wilson

introduced us to the famous Kurume azaleas from Japan in 1914, he was aware "that garden lovers of America and Europe knew virtually nothing of this wealth of beauty."¹² The lovely Satsuki azaleas were unknown to us until Morrison arranged for a large shipment from the Chugai Nursery in 1939. Yet both of these classes of azaleas had been cultivated in all the population centers of Japan for over 250 years.

It was not until the series of USDA/Longwood collecting trips to Japan in 1956 and 1961 that we appreciated the complexity of the distribution of *Rhododendron japonicum* and *Camellia japonica* in the wild. Such information is extremely important in selecting parental materials for breeding for cold resistance, flowering time and color range. We still continue to uncover new knowledge of plants of Japan, both wild and cultivated, with each additional plant collecting trip.

Perhaps the most striking example of our reluctance to accept Japanese agricultural prowess is the fact that our Agricultural Attaché reported on the popularity and value of the Durum short-strawed wheats of Japan in 1874, yet they did not make their profound contribution to the "green revolution" until after they were introduced from Japan as the Norin strains by Salmon in 1947.⁹

In the same manner, we have been slow to use the Japanese horticultural literature that spans several centuries. Obviously the language barrier has been a great deterrent. Although there is a broad array of Japanese books in collections in this country, they are not readily available to most horticulturists. For a long time there seemed to be no interest in the horticultural and landscaping arts so peculiar to Japan. How many professionals can recall any degree of mention of Japanese horticulture in their academic training? But with the occupation of Japan after WWII, there arose a new and enduring interest in this subject. Flower arranging, bonsai and Japanese gardens attracted considerable interest among the military and diplomatic people stationed in Japan. It is an interesting commentary that a style of horticultural art restricted to the samurai and noble classes of Tokugawa, Japan, received its greatest attention in the United States through their modern American counterparts who occupied their country. This post-WWII interest in Japanese plants is yet another incen-

tive to better understand the foundations of Japanese horticulture and make even more provisions for students to study there.

Japanese Nurseries

We need to move quickly in this direction. Post-WWII recollections of Japan are dimming, and there is a trend toward western-style commercial horticulture in Japan. The traditional Japanese nursery has always been small, and the families tended to congregate into specialized communities—mainly Angyo, north of Tokyo; Ikeda, near Kobe; the vicinity of Kurume; and around Nagoya. These nurseries consist of hundreds of small patches of individual plants, each block owned by a single nursery family. Every nurseryman became a specialist following methods handed down by his father. Many of the plants now grown are described only in handwritten lists or elaborate calligraphic manuscripts, some dating back to the natural history period. The present-day owner may train exactly the same specimens as did prior generations, particularly black pines and maples.



M. Joyner

Japanese maples (*Acer palmatum*) with their near-infinite variety of cut leaves and their handsome small habit have become an American favorite.



Pamela Harper

Popularized during the Natural History period, *Adonis amurensis* is a Japanese symbol of prosperity.

I recall visiting one such small nursery near Angyo specializing in *Adonis amurensis*. This is a typical “natural history period” plant. *Fukuju-so*, as it is known in Japan, is given at the New Year as a symbol of prosperity because of its bright-yellow flowers. Once there were more than 250 cultivars in this nursery, but now the owner grows no more than twenty. He is presently engrossed in the culture of American cultivars of Oriental magnolia hybrids, which he propagates with ease. He laid out on the straw mats of his farmhouse a volume of folded pages several feet long displaying forty-six old types of *fukuju-so*, beautifully illustrated in color. On another occasion, we visited a grower of *Ardisia japonica* who grows fifty-seven cultivars of this popular natural history period plant. In this case, the cultivars are described and illustrated in a contemporary Japanese horticultural periodical. But in either case, it is unlikely that American horticulturists will encounter these publications. Similarly, *Psilotum* (a primitive fern relative) achieved great popularity, and hundreds of bizarre forms were cultivated and described in wood-

block prints. When I sought these in 1956, there were scarcely a dozen varieties in the hands of a few growers.

The point I want to make here is that for every native plant in the hands of the skilled Japanese horticulturist a bewildering array of unique variants arose, often selected for characteristics that would be obscure to the casual observer.

As we now know, many of these forms no longer exist and this loss of cultivars is certain to continue. The Japanese nursery industry is changing due to economics and opportunities for export. Large cooperatives have been formed, in one instance producing over thirty-six million small plants annually. Obviously under such a system only the most popular and readily propagated varieties will be accommodated. A further distraction is the arrival of the garden center with shipped-in plants and packaged merchandise. At the old Akashi nursery site where Wilson collected the Kurume azaleas, a modern garden center has replaced the nursery. In 1976, when we asked to see the guest book that Wilson signed in 1914 and which I had signed in 1955, no one seemed to know or care about this small point in horticultural history.

Older nurseries are under particular threat from urban sprawl and super-highway construction. This is particularly noticeable in the Angyo region where great highways to the north are being developed. When David Fairchild visited Japan in 1902, he emphasized that those who appreciated how well Japanese plants thrive in America would find new forms and get new ideas from a visit to the nursery regions of Japan. But this had better be soon or the new ideas will be mostly Western.

We can expand our knowledge of Japanese horticulture in several ways. Modern Japanese books often have English summaries; others are written in both Japanese and English. A good example is the five-volume series of technical illustrations of important Japanese trees.⁵ Since the interpretation of *tree* is rather liberal, a number of familiar horticultural shrub species are included. The descriptions are in both Japanese and English, and although that portion of the text relating to the distribution maps is only in Japanese, this is not a serious defect. Anyone studying Japanese plants should have access to this series. Likewise, Ohwi's *Flora of Japan* is the English counterpart to the original



Photos by Author

A strain of *Lagerstroemia fauriei* native to Yakushima has proven valuable in breeding programs at the U.S. National Arboretum because of its mildew resistance.



The intense interest in breeding, training, even bonsaiing of chrysanthemums is evident at the heavily attended annual Japanese shows in public gardens.

Japanese edition⁸ and is considered to be more extensive. It is, in fact, the only comprehensive flora of Japan in English.

Many classical books written in early style are being reprinted with modern Japanese supplements since the younger Japanese cannot read the old characters readily. There is no reason why similar English supplements to the most important ones could not be prepared. For example, the five volumes on azaleas, *Kinshu Makura*, written in 1692, have been reprinted in Japan with a modern supplement. We are now in the process of preparing an English supplement. It should be of interest to azalea enthusiasts because it dates many current varieties and illustrates flower forms of value to plant breeders.

Present-Day Collecting

We must continue our plant collecting efforts for both wild and cultivated trees and other plants. Fortunately, there is no serious threat to most wilderness areas of Japan because the entire population is conservation-minded and has historically understood the value of their natural areas. Desirable characteristics are constantly being discovered in seed

populations from recent Japan explorations, including pest resistance and improved range of adaptation. One of the best illustrations of this trend is the discovery of powdery mildew-resistance in collections of *Lagerstroemia fauriei* that I first introduced into cultivation from Yakushima during the USDA/Longwood exploration of 1956. This species has been used with great success in crosses with the common crape-myrtle at the National Arboretum.

There are some excellent technical aids dealing with plant distribution in Japan. One of these is the publication by Nuttonson⁷ on Japan's vegetation and climatic analogues in North America. Armed with such materials, we need to explore each significant species throughout its natural distribution in Japan. Because Japan is linearly disposed over only 1,500 miles, a great opportunity exists to do this. The validity of this procedure can be demonstrated by the decumbent *Aucuba japonica* var. *borealis*, native to northern Honshu and Hokkaido. Because of its habit, this variety takes the species much farther north than the normal upright plant. It has proved sufficiently stable and hardier than the species so that collections I made in Hokkaido

in 1961 have become a useful, low-growing, broad-leaved evergreen for landscape use. We now appreciate that *Cryptomeria japonica* comes in at least four geographical races related either to the moist, high snowfall regions of Japan Sea or the sunny, dry winters found on the Pacific Ocean side of Honshu. We are aware from extensive collections of *Rhododendron japonicum* I gathered in this precise manner that populations from its extreme southern station in Kyushu differ markedly in range of flower color from those at the northernmost end of Honshu and that this may be correlated with hardness. The fact that *Rhododendron kaempferi*, one of the most useful Japanese species, occurs from the sea-level paddies of Kyushu to alpine bogs in Hokkaido must be taken into account in any serious breeding program.

The daylily is an interesting case in point. There are several species of *Hemerocallis* described for Japan and these are distributed from Kyushu to Hokkaido and beyond. The earliest flowering is in May but most bloom in June through August. In southern Shikoku, *Hemerocallis littorea* from Cape Ashizuri does not begin to flower until October and continues until December. This Cape is decidedly a warm-temperate environment. When plants I collected were cultivated at the National Arboretum, *H. littorea* flowered at precisely the same time as in Japan. As a consequence, it is a most useful species for breeding. To the best of my knowledge no other foreign collector has visited this remote locality since my visit in 1956, although it is well worth the attention of future collectors investigating Japanese plants. Because of my years of field experience in Japan and the increasing background of resource information, I am convinced that nowhere else do we have so unique a plant-collecting situation in relation to ornamental plant improvement in the United States as we do in Japan.

Again, we must turn our attention to the fact that Japanese plants are easily adapted to the cultural environment of a significant portion of the United States. Japan proper is a mountainous and hilly country extending from the 31st parallel to the 45th parallel. Add to this the Ryukyu Islands and the range is extended into the tropics by seven hundred miles to the 24th parallel. A latitudinal comparison of Japan and North America reveals that the northernmost parts of Japan equate

to Maine and New York, while the southernmost part of Kyushu is in line with Florida, Alabama and Georgia. In between are many localities with analagous climates as established by Nuttinson using a comparison of total climatic data. There are many examples of related species in Japan and the eastern part of the United States that bear out this analogy, especially when cultivated in their counterpart climates. For example, we have *Cornus florida* in the eastern United States and *C. kousa* in Japan. *C. kousa* grows extremely well here in the East and complements its American relative by flowering a month later. *Pachysandra procumbens* is native to Appalachia and *P. terminalis* to the mountains of Honshu and is, of course, one of our most useful groundcovers. But it is particularly interesting to me to see how the wild azalea, *Rhododendron bakeri*, grows on Gregory Bald in western North Carolina exactly as its counterparts do on the eroded volcanic cones (*daira*) of southern Japan, even evolving similar series of natural hybrids. If we examine the counterpart station climatological tables prepared by Nuttinson, we find that the two localities have precisely the same climates.

In summary, Japan is a remarkable resource for ornamental plants, both as a result of its natural wealth of species and the impact of historical circumstances on the use of these resources. Many Japanese species and cultivated forms have been introduced already, but this is only the tip of the iceberg. Opportunities exist for American students to make an impact on the use and improvement of earlier introductions through study in Japanese institutions. Many remote areas of Japan have been visited perhaps only once by American collectors, and many species are known only superficially from a breeding standpoint. We need to better understand the natural variability of Japanese plant species and the extent that they have been used during so long a horticultural history. A vast array of horticultural forms developed in old Japan has been lost, and with the changes in modern technology and western horticultural practices, this may continue. Young American horticulturists still have opportunities to become knowledgeable in this classical field. They need to be given an opportunity to undertake research, plant collecting and academic study in Japan.

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Deer and Gardens

Deer are increasingly the bane of gardeners in rural parts of the North and are a problem even in some suburban areas. Herds are large in part because of the reduced snow in recent years, which makes it easier for these animals to forage in winter. In fact, there was a good snow cover in much of the Northeast in the winter of 1981-82, but the deer still remain healthy, much to the chagrin of the growing Anti-Bambi Lobby. It will take some years before herds are reduced to normal size.

The deer have had their effect on the native flora. It is common now to find hourglass-shaped mountain-laurel (*Kalmia latifolia*) in the woods. These are tall old shrubs with a bare midsection caused by deer browsing in winter. The animals cannot reach the tops to browse, and the bottom foot or so is beneath the snow line, hence protected. Apparently no one has told the deer that mountain-laurel is supposed to have toxic foliage. In spring deer are very fond of young sumac foliage. Staghorn, especially.

Gardens are affected, too. The deer's Number One favorite among domesticated shrubs is the yew (*Taxus*), which also happened to be the Number One favorite of landscapers hiding unsightly house foundations during the building booms of the 1950s and '60s. No one told the deer that *Taxus* is supposed to be toxic, either. Deer have many other favorite woody plants, including rhododendrons, and damage occurs almost willy nilly once a few of them happen to invade. In rutting season one of life's darkest moments is finding an antler-shredded paperbark maple the morning after.

Perennials are not spared, especially the leaves of hosta and summer phlox, and the flower buds of lilies and daylilies. Epimedium and astilbe are resistant, as are many aromatic plants and ones with prickly or hairy leaves. Damage is worst in gardens immediately surrounded by woods. A garden in an open field that is cut but once or twice a summer is relatively safe, even though deer may browse in the field itself. Restricting one's efforts to gardening in containers on a terrace is the answer for some people, but a cheeky deer may still nibble on the ornamental kale.

As is true for the common cold, there are many prescriptions: fences of various sorts, thorny hedges, plastic netting, commercial sprays such as Weyerhaeuser's MGK repellent, hot pepper sauce, human hair strung from shrubs, egg whites, lion manure, rock music. Try a few, and don't give up the garden. ❀



Plants that walk . . .

THE TROUBLE WITH TRIFIDS*

Pamela Harper

Reprinted with permission from GREEN SCENE, January 1982

In days gone by I used to listen to a science fiction radio series called *The Day of the Trifids*, trifids being plants that could walk. There are trifids in my garden. The very worst of them is the trumpet creeper (*Campsis radicans*). When I think how I yearned for that plant in the past, struggling without success to get it established in gardens in England, Connecticut and Maryland. Now, in Virginia, I cannot persuade it to leave. Bad enough that each beanlike pod contains upward of four hundred flaky seeds, and that each of them germinates, but the real trouble comes from thonglike roots traveling underground. After ten years of battle with weed killer and determined digging out as weapons, the fight is not yet won, and I begin to suspect it never will be.

*trifids (tri'fids), n. plants that walk

After a month away from home, two wisteria bushes, tidy when I left, waved a greeting with 10 foot tentacles, perhaps to distract attention from even longer ones stealthily snaking over the ground towards the nearest pine. Really, no southern gardener in her right mind would plant wisteria. I've known one family that moved to escape from it; it was not even their own but one in a neighbor's garden. I've almost been driven out by my neighbor's paper-mulberry (*Broussonetia papyrifera*). It grows fifty feet from our fence, but ropey yellow roots spread out like a subway system, throwing up new trees whenever they get the chance. The only remedy I can think of is to sneak over the fence after dark and help that tree meet an accident. If the neighbors retaliate against my wild black cherry trees (*Prunus serotina*) I shall not complain; each spring, I weed out thousands of seedlings. I know why

Wherever the roots of the paper-mulberry (*Broussonetia papyrifera*) spread, small trees are likely to spring up.

George Washington chopped down that cherry tree.

Selfseeding Nuisances

Several years ago I was given the double form of celandine (*Chelidonium majus*). "It is rampant, but you won't want to part with it," said the donor. It is, and I don't, but I must, or yield to it the whole garden. It is a lovely thing, related to the desirable celandine-poppy (*Stylophorum diphyllum*) and with similar glaucous leaves, but it multiplies with much the same rapidity as aphids. Because it flowers all through summer, deadheading isn't practicable; it would take several hours every day. Most double flowers don't self-seed to the nuisance point but this one is an exception. I recommend it, single or double, but only when it can have a whole semishaded woods to itself, not in a garden.

It took me a while to identify as *Agastache foeniculum* or anise-hyssop a plant given me as licorice plant. To me the scent from crushed leaves is definitely that of licorice, reminiscent of childhood and the Pontefract cakes (discs of licorice) and licorice shoelaces in the village store, side by side with three-cornered paper bags filled with sherbet powder to be sucked up through a licorice "straw." *Agastache* is not a flamboyant plant but every photographer should have one in the garden for the sake of the bees and butterflies that crowd the spires of lavender labiate flowers for many weeks in late summer and autumn. Having *one* in the garden is, however, not easy to accomplish, for once it has flowered there will be widely scattered progeny unless daily attention is paid to deadheading.

If some of the hours spent weeding result from well meant gifts of friends, I have no one but myself to blame for *Anemone tomentosa*, which is sold as *A. vitifolia* 'Robustissima.' I

Anemone tomentosa (*A. vitifolia* 'Robustissima' of the trade) can be an aggressive colonizer if conditions are favorable.

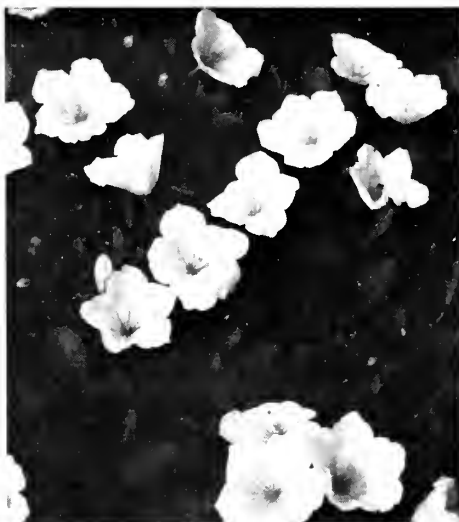
paid good money for that, and I'm not—quite—sorry. I am, however, preparing myself for the day when we may have to part. I can't say I wasn't warned: "It will colonize large areas fairly quickly," writes Graham Thomas in *Perennial Garden Plants*. In our area substitute "very" for "fairly." Japanese anemones don't, by and large, much appreciate hot summers, but 90°F for week after week troubles this one not at all. It flowers a bit earlier than the others, the flowers a dusky pink, and I am fond of it for all its willful ways.

If I might be permitted a little self-plagiarism, I once wrote: "A favorite for late summer bloom is garlic chives, *Allium tuberosum*, bearing white doliies of small, fragrant stars on sturdy, 18-in. stems. But don't let this plant go to seed lest scallion turn rapscallion, distributing its progeny all over the garden." Do as I say, not as I do, for I failed to take my own advice and am now paying the price.

Ivy on the Walls and Other Bothers

Came a pause in the weeding, a coffee break, during which I perused *Green Scene*, reading ruefully Amalie Ascher's remarks about ivy on house walls. She is absolutely right, but I've planted ivy against this house – how else





The delicate white cups of *Nierembergia rivularis* are welcome if the plants' tendency to romp can be checked.

The toad-lily (*Tricyrtis hirta*) can have exceptionally high rates of seed germination but the seedlings usually stay close to the parent.



to conceal an over-abundance of red brick? Not the common English (or Irish) ivy, however, but smaller leaved, somewhat less busy kinds. Just the same, after a slow start, they are making rapid headway. As I pass by I tug away a few strands to delay the time when the house will be engulfed. Perhaps we'll have moved by then.

Anita Kistler, a West Chester, Pa., friend, who concurs with the hardness of the above-mentioned trifids in her area, says she finds *Nierembergia rivularis* hard to find and hard to keep, except in a protected spot in her rock garden. I find it hard to get rid of. So lovely it is, with inch-wide saucers of unbesmirched white hovering over running mats of small, soft green, paddleshaped leaves. Though reluctant to part with it entirely I did, last year, reduce to a one-foot patch what had been many yards. Now it covers yards again, and a bit that got transplanted along with some bulbs has started another take-over bid in a different part of the garden.

Toad-lily (*Tricyrtis hirta*) has bright green, felted pixie-ear leaves in two even rows, in much the same way as 'Erecta' ivy, save that at the base they enfold the sturdily upright, velvety two-foot stems. Attractive all season, it is a real attention-getter when, in autumn, it bears in the leaf axils and at stem tips flowers, usually clustered in twos or threes, not unlike a scaled-down passion flower (*Passiflora caerulea*), the stamens and split pistil held like spokes of a wheel raised on a column over the ring of petals, the color scheme being palest mauve mottled with purple. In the spring after its first flowering I thought the reemerging plant, modestly stoloniferous and now multi-stalked, was about to be engulfed by a ground-concealing carpet of crabgrass seedlings, but these turned out to be infant toad lilies. I have it facing east in a slightly raised bed under tall pines abutting the gravel drive. As I write there must be a thousand of these little plants jostling each other for living space. They do seem to stay close together and have not, so far, popped up in the furthest reaches of the garden.

Polygonum (knotweed) and *Polygonatum* (Solomon's seal) are well known to most gardeners, in one or another of their ramifications, but few know *Polygonella*. Hortus says there are nine species "similar in appearance and of little horticultural value." I think



Garlic chives (*Allium tuberosum*) must be scrupulously deadheaded to avoid ripe seed germinating throughout the garden.

otherwise, and so did Caroline Dormon who, in *Flowers Native to the Deep South*, recently reissued, wrote: "*Polygonella americana* might well be called 'snow-flower,' because from late summer till fall it covers sand hills with airy masses of snowy bloom. It is a low shrub, which blooms better if treated as a woody perennial and cut back almost to the ground after flowering. The plant somewhat resembles a small, much-branched juniper but in late summer becomes a fluffy ball of snow. The tiny white flowers, rarely light pink, are charming when cut. It blooms when only 6 in. high and seldom attains a height of more than 2 ft. It grows easily from seed, blooming the first year. In deep sand, on hillsides, from Missouri to Georgia and Texas." Thomas Buchter, a past director of the Henry Foundation in Gladwyne, Pa., says it would be a plant well worth experimenting with and adapting to northern gardens. He feels it is important to assure good drainage since excessive moisture in the root zone in winter causes damage. If you'd like to make up your own mind you'll be glad to know that there is now a mail-order nursery specializing

in southeastern native plants (Woodlanders, 1128 Colleton Avenue, Aiken, SC 29801. List \$1.50). All plants are nursery propagated, not collected in the wild, so you may sometimes have to wait while stock is built up. My *Polygonella*, with only winter-damaged stems cut out, is a little over 2 ft. high, an upright bush of blue-gray, zigzag stems clad in needlelike leaves. The flowers are white fading to pink. I can testify to the ease with which it grows from seed, for, in going out to measure it, I counted nineteen little bushlets about 4 in. high. Will it become a trifid? Not, anyway, if Caroline Dormon's suggestions are followed, and it seems it could be grown as an annual in areas where it is not winter hardy. Here, in sun and enriched sand, it has survived 5°F.

Should you deliberately plant these trifids? In my opinion black cherry and paper mulberry are always more trouble than they are worth. The others have garden value provided it is understood that they are not labor-saving plants and that their exuberance must be kept in check by frequent pruning and deadheading. ❧



SORREL.

Americans are discovering . . .

THE PUNGENT PERSONALITY OF SORREL

Bryan Miller

Reprinted with permission from THE NEW YORK TIMES, August 11, 1982

In the all-too-brief life span of fresh herbs in the Northeast, mid-August marks the beginning of the end for many. But there are some robust perennials whose longevity we can

look forward to celebrating until the last splash of Indian summer in October. One of them is sorrel.

A sassy member of the herb family whose

pungent personality has invited both scorn and admiration over the centuries, sorrel has been in the good graces of Americans lately, thanks to the nouvelle-style French recipes of the 1970's that used it in abundance.

Sorrel has been prized in French cooking for its invigorating, acidic edge since at least the seventeenth century, when the chef and author Pierre François de la Varenne described sauces of meat drippings combined with either vinegar or the juice of sorrel. Historical accounts say English cooks alternately praised or ignored sorrel over the years, and references in most vintage American cookbooks mention its possible use only in soups and salads, if at all.

The sharpness of cultivated sorrel (wild sorrel is rare in the United States, but the flavor is similar) comes from its high oxalic acid content. French cooks solve the perennial problem of deboning shad by stuffing the fish with purée of sorrel, whose acidity all but dissolves the bones so that one can eat the shad without worry.

A handful of fresh shredded sorrel leaves brightens vegetable, fish or cream-based soups, not unlike watercress. Sorrel also makes a nice garnish for classic cold summer soups, such as vichyssoise, and it complements salads, whether diced and added to dressings or sprinkled over the greens. The leaves can be added to spinach and turnips before cooking to perk them up, or, steamed in its own moisture, sorrel can serve as an accompaniment to roast goose or pork in place of applesauce.

Sorrel marries particularly well with eggs. Richard Olney, in his book *Simple French Food*, (Atheneum, 1974), offers several exceptional recipes. One involves stewing shredded sorrel leaves in butter until they form a purée. Stir in cream and season to taste. The sauce is poured over hard-cooked eggs that have been halved and placed, cut side up, in a baking dish. Everything is sprinkled with bread crumbs sautéed in butter and then baked in a hot oven for about 15 minutes until the sauce lightly browns.

Another easy but delicate recipe calls for removing the yolks from halved, hard-cooked eggs, mashing them with diced fresh sorrel, Parmesan cheese, salt and pepper, and then stuffing the mixture back into the egg whites. The eggs are placed in a baking dish coated with olive oil and sprinkled with

sorrel, topped with a bit of oil and more Parmesan, and then cooked for about 15 minutes.

Green mayonnaise with sorrel instead of parsley is a tangy summer mate for cold meat. Historical accounts describe peasants in England and Ireland making a cold meat sauce of mashed sorrel, vinegar and sugar.

One of the most favored uses of this herb is making sorrel cream sauce for poached salmon or a mild white fish such as sole. Make a velouté with fish fumet (simply mix the fumet with a butter-and-flour roux), and then add to it sorrel that has been blanched, drained, simmered in butter and sieved. Whisk in heavy cream until the sauce reaches the desired consistency. Before pouring it over the poached fish, finish off the sauce by whisking in several pats of butter. Similar sauces for chicken and veal work well using their respective cooking liquids in the velouté.

Area markets should carry fresh sorrel until well after basil and tarragon call it a summer. Frank Pollock, proprietor of Rolling Hills Farm in Kunkletown, Pa., who delivers fresh sorrel weekly to restaurants and wholesalers in New York, New Jersey and Connecticut, says his supply should last well into October. "The secret to prolonging the season, whether it's a home garden or commercial operation, is to keep removing the leaves as they grow and pulling off the flowers when they develop," Mr. Pollock says.

Local suppliers say that demand for sorrel continues the steady growth that began about five years ago. "People are finding that sorrel is a wonderfully refreshing herb during hot weather," Mr. Pollock says, speaking by telephone from his farm in the Poconos. "Often we are working out in the field a quarter of a mile or so from any water, and when we get thirsty, we grab some leaves of sorrel and chew on them. It's amazing how it quenches the thirst instantly."

It is difficult to give advice on how to choose fresh sorrel in the market because there are so many strains, each with different characteristics. In April and May, early in the season, sorrel's broad leaves normally are pale green and wispy; later in the summer they are deeper green, almost the color of parsley. Regardless of color, look for leaves that are not yellowish or limp. Sorrel is among the easiest herbs to grow at home from

seed, and it likes sandy soil. Although it does not dry well, it can be packed in plastic containers or bags and frozen for later use.

Sorrel Soup

- 3 tablespoons butter
- 1 medium onion, diced
- 4 cups shredded sorrel leaves
- 2 medium white potatoes, quartered
- Salt and pepper to taste
- 2 tablespoons crème fraîche
- 1 tablespoon lemon juice.

1. In a deep pot sauté onions in butter over medium heat for five minutes. Add sorrel and cook another five minutes.

2. Add potatoes, cover with a quart of boiling water, and add salt and pepper to taste. Reduce heat and simmer, covered, for 45 minutes.

3. Pass soup through a food mill. Pour soup back into the pot, and stir in crème fraîche. Add lemon juice before serving.

Yield: 4 servings.

Zucchini-Sorrel Soufflé

- 11 tablespoons butter
- 2 tablespoons flour
- 4 medium zucchini, shredded (about 3 cups)
- 1 tablespoon salt
- 2 cups shredded sorrel leaves
- 4 egg yolks, beaten
- 5 egg whites
- Salt, pepper and nutmeg to taste
- 1½ tablespoons flour.

1. Preheat oven to 400 degrees.

2. Butter a soufflé dish with 6 tablespoons of butter and dust it with ½ tablespoon of flour. Place it in the refrigerator to chill.

3. Put zucchini in a colander, and sprinkle them with a tablespoon of salt. Leave for half-hour to let any moisture drain off. Wrap zucchini in a dry towel, and squeeze out remaining moisture.

4. In a pan melt 4 tablespoons of butter, add zucchini and sorrel, cook about 15 minutes over medium heat or until zucchini appear to be dry and lightly brown.

5. Put zucchini in an electric blender or food processor and purée. Melt one tablespoon of butter and mix in the remaining

flour. When the mixture thickens, pour into zucchini mixture.

6. Whisk egg yolks over low heat for several minutes until they begin to bind and then pour into zucchini mixture. Add salt, pepper and nutmeg to taste.

7. Beat egg whites until they form peaks, and fold them into the zucchini mixture. Gently pour the mixture into a soufflé dish, and place it in a roasting pan. Pour warm water into the pan until the water covers most of the soufflé dish. Bake for about 25 minutes.

Yield: 4 servings.

Zucchini Stuffed with Sorrel

From "Simple French Food" by Richard Olney
(Atheneum, 1974)

- 1 large onion, finely chopped
- 3 tablespoons olive oil
- 6 firm zucchini (2 pounds)
- 1 cup loosely packed sorrel leaves, stemmed, washed, drained and shredded
- Salt and pepper to taste
- ⅔ cup rice, parboiled 18 minutes, rinsed and drained
- 1 teaspoon finely chopped fresh marjoram (or herb of your choice)
- Olive oil
- ½ cup water
- Freshly grated Parmesan cheese.

1. Slice the zucchini lengthwise, scrape out most of the flesh and chop. Set aside the shells.

2. Cook the onion gently in the oil until soft and yellow. Add the chopped zucchini flesh to the onion and continue cooking, stirring or tossing regularly, until it is soft and its liquid reduced.

3. Add sorrel and seasonings, and cook for a minute longer, until the sorrel has turned grayish and begins to melt.

4. Add rice and marjoram to the mixture. Adjust the seasonings.

5. Oil the zucchini shells inside and out, pack them gently full of the stuffing, mounding with a spoon, and arrange them in a large gratin dish.

6. Pour water into the bottom of the dish, sprinkle the surface of the stuffed zucchini with cheese, dribble over oil, and bake for 40 to 45 minutes in a 375-degree oven.

Yield: 6 servings. ❧



Raised rows encourage intensive cultivation.

*An ancient gardening method that's withstood
the test of time...*

RAISED BEDS

Walter Chandoha

Reprinted with permission from THE FAMILY FOOD GARDEN, August/September 1982

There is nothing mysterious, complicated—or new—about raised bed, wide-row gardening. Man has used this method of growing things since the beginnings of agriculture. Raised beds are used today in all parts of the world—especially where arable land is scarce—for both commercial and home gardens.

Think of a planted flower pot—this is a raised bed in its simplest form. Make it wide and long, take away the pot and you have a wide raised row. But keep some sort of a support—timbers, stones, railroad ties, cement

blocks—around the pile of soil and you have a conventional raised bed.

The only problem with conventional raised beds is their cost, both in materials and in time. Before I made the change-over from flat, skinny row gardening to raised, wide rows, I made two raised beds using 6-by-8-inch oak timbers to contain the soil. The quality and quantity of the carrots, beets and onions I harvested from those two beds was so impressive that I planned to convert the entire garden.

But when I priced heavy timbers (expensive) and then cement blocks (too costly), I changed my mind. Later, during a winter trip to the Canary Islands, I discovered a cost-free way to make the beds. There, many gardeners used wide raised rows to grow vegetables but no supports were used to contain the soil—it was simply banked to make long, flat plateaus above the surrounding area.

Building the Beds

Making the changeover from flat gardening was easy. In mid-April the entire garden was rototilled. Starting at one end, I stretched two parallel lines 3-to-4-feet apart the width of the garden. I shoveled soil to a depth of ten inches into the area between the lines from what would later be adjacent pathways. Lime, compost and horse manure were added and mixed with the soil. The bed, now about one foot high, was raked smooth and was ready to plant; later, rains settled it to 6 to 10 inches.

As more beds were needed and as time permitted, I continued making the changeover until the entire 30-by-60-foot garden was all in raised wide rows. As originally constructed, all of the rows were thirty feet long but since thirty feet of lettuce or beets would be far more than our family could handle, I divided the rows into smaller sections—fifteen feet of onions in five closely planted rows kept us in onions most of the winter. The other fifteen feet were evenly divided between beets and lettuce. A couple of zucchini hills got six feet of row as did a planting of shallots; bush cucumbers got a whole thirty-foot row but peas and beans got fifteen feet each. Some of the thirty-foot rows were not actually divided into smaller beds but were planted with a variety of vegetables with flowers dividing them. The flowers added a spark of color to the garden and gave me a chance to try some new varieties.

None of the raised rows is wider than four feet—some are no wider than two feet. By keeping the beds narrow they're easily accessible and the need to ever walk on them (thereby compacting the soil) is eliminated.

The walkways between the rows also vary in width but most average twenty-four inches. Because I need space to move around when I take pictures, my walkways are wider than most gardeners require.

Planting the Beds

Since all plants need nourishment, the beds are covered with strawy horse manure in the fall as crops are harvested or frost-killed. In the spring at planting time more additions are added to the beds as required—maybe more horse manure and wood ashes for members of the cabbage family; sand for root crops; lots of wood ashes for the onion family; leaf mold for potatoes, and so on.

Each row in the garden is numbered, and if the row is divided into sections, each division gets a letter with the number. The entire garden is charted and before planting I determine—on paper—what goes in which plot. By consulting both the spring and fall charts of the previous years, I avoid planting the same crop in the same space. This crop rotation fools the bugs and helps avoid diseased plants.

First to be planted in the spring are the cold-hardy vegetables—onions, peas, cabbage, broccoli, lettuce and spinach. Next carrots and beets go in. Then as the weather warms, beans, zucchini and corn are planted. Finally, around the end of May when the nights get warm, tomatoes, peppers, eggplants, melons and squash go in.

Watering

To grow steadily, vegetables need an inch of water weekly. When the ground is dry, I water the raised wide rows with a spray sprinkler at the end of a garden hose. The gentle spray falls softly on the seedlings and slowly penetrates the soil. When a bed is saturated and water begins to run down the sloping sides, I go on to the next bed. The need to water is decreased as the plants leaf out and shade the soil. Mulching with grass clippings or other organic material further lessens the need to water. Last summer, even during severe dry periods, the mulched raised rows required far less water than did those that were unmulched.

Weeding and Fertilizing

It's less of a chore than in flat, skinny row gardens. In the walkways and between widely spaced plants I use a conventional hoe. For plants growing close together—like onions—a hand claw-rake is effective. Raking takes care of tiny weeds that sprout on the slanted sides of the beds. By reaching across the width of a bed and raking toward me from the

Preparing the raised rows. This is a good time to add nutrients and soil conditioners.



Spring crops can be harvested and later crops planted with less effort because the raised-rows area is concentrated.



middle of the walkway and up the slanted sides, I can keep the beds neat and weed-free. The secret to keeping all gardens free of weeds is to get rid of the pest plants when they're tiny. Ten minutes in most gardens gets rid of just-sprouted weed seedlings—but wait a couple of weeks and that ten-minute job becomes a backbreaking half-hour chore.

As with watering, the need to weed is minimized when the beds are mulched. Handiest for most gardeners are grass clippings. To prevent tight matting, dry the clippings for a day before using for mulch.

Before switching to wide raised rows I used to waste a lot of fertilizer by broadcasting it over the entire garden and then turning it under—I'd have not only fertile rows but also fertile walkways. Now fertilizer is applied only to the beds and can be selectively increased as required.

When to Change to Wide Raised Rows

I converted my flat garden to wide raised rows in the spring only because I was eager to try what I saw in the Canary Islands. It was an especially cold and wet spring so starting was delayed until mid-April—when there are millions of things to do around the house and in the garden. It would have been better to start in the fall when chores are less numerous and not so urgent—and there's no danger of working with soil that's too wet.

Start building the raised rows as crops are harvested from September until the ground freezes. Pull out all weeds and spent vegetable plants, add humus, compost or manure, sand and lime as needed.

Don't try to convert the entire garden in a single weekend. Go easy. From the first frost until the ground freezes hard there will be six to ten working weekends—so you'll have plenty of time to make the changeover to wide raised rows. And once it's done, your gardening will be easier and more fruitful.

You'll no longer have to turn over the soil

each spring—and because they drain quickly, the raised wide rows are ready to plant at least two weeks sooner than flat gardens.

Advantages of Planting in Wide Raised Rows

1. *Greater yield from less space.* Closely planted wide rows eliminate many space-consuming walkways.

2. *Gardening starts early.* Raised rows thaw out sooner and warm up more quickly than flat gardens.

3. *Beds easy to modify.* Since each bed is a self-contained isolated unit, soil adjustments can be made to individual crop preferences.

4. *Small beds encourage small plantings.* By staggering planting dates, the feast and famine of a single big planting is eliminated.

5. *Better drainage.* Because beds are never walked on, even unmodified soils drain better. Adding sand and lots of humus improves drainage even more.

6. *Bigger yields with succession plantings.* Because vacant spaces in raised rows are highly visible, there is a tendency to replant immediately after an earlier crop is harvested.

7. *Less weeding.* Once wide-planted vegetables leaf out, the ground underneath is shaded—weeds can't grow in shade.

8. *Less fertilizer needed.* Fertilizer goes only on the beds, not on the walkways.

9. *Less water needed.* Only beds are watered and shaded ground under thick foliage needs less water.

10. *Less mulch needed.* When used only on beds, minimum amount is needed. Mulching also keeps soil temperature constant.

11. *Yearly tilling unnecessary.* Loose, friable soil of raised rows is easily worked with rake and hoe.

12. *Better bug control.* Raised wide rows encourage record keeping. When crops are rotated to different parts of the garden each year, bugs are confused. ❧

Setting Fungus Against Fungus

Verticillium is one of the most destructive soil fungi, affecting a wide range of plants from the tomato to the maple, causing them first to wilt, then die. Perhaps help is on its way. Scientists at the USDA's Agricultural Research Service, Beltsville, Maryland and Bridgeton, New Jersey have done some field tests on a special fungus, *Talaromyces flavus* which, when inoculated into eggplants that are eventually planted in soils where verticillium is present, provides a significant measure of protection. ❧

TREE BARK FOR WINTER IDENTIFICATION

Donald W. Jackson

Reprinted with permission from THE CONSERVATIONIST, January-February, 1982

Many features are present during spring, summer and fall to help amateur botanists differentiate among forest tree species; leaf morphology, autumn color, and floral characteristics (size, shape, color, duration) are most frequently used. Much confusion arises, however, in identification of woody plants by those who visit wooded areas in winter.

A few species have persistent fruit, but

many do not, and due to competition the growth habit or form of trees is rarely helpful unless they are located in open areas. Even when its development is unrestricted, a tree's shape is not always a reliable clue to identification, since some species do not possess a truly characteristic form, and it is common for the outline of many to change with maturity. Buds are often used as a distinguishing



Left, the swollen trunk ridges and blueish-gray color are characteristic of the American hornbeam. Above right, the eastern hop hornbeam has exfoliating bark similar to but not as coarse as the shagbark hickory. Below right, deeply-cut and corky-textured bark of the chestnut oak.



Blocky ridge-and-furrow bark plates of the brown, red-tinged sassafras at maturity.

trait and represent a tremendous aid in winter botany, but they are frequently out of reach as competition forces the development of long, narrow crowns with few branches near ground level.

One of the best and, unfortunately, most overlooked characteristics for tree identification during the leafless season is the bark. The trained eye can quickly and easily recognize a surprisingly large number of species by the color and pattern (exfoliating, ridge and furrow, scaly, etc.) of their bark. Although such examples as the paper or yellow birch (*Betula papyrifera* and *Betula alleghaniensis*, respectively) and the striped maple (*Acer pensylvanicum*) are exceedingly easy to identify by their bark, most species require a little more practice.

The shagbark hickory (*Carya ovata*) is a large tree attaining heights of one hundred feet or slightly more. Often found growing in a wide array of soil types, this species can be readily identified by the long, narrow, grayish-colored plates of bark which exfoliate in large numbers from the main stem. Hickory wood is often used for tool handles, such as axes, where its combination of strength and shock resistance is a desirable quality.

Oaks

A number of oak species can also be identified by their bark features. The chestnut oak (*Quercus prinus*) is a medium-to-large tree which normally reaches heights to 75 feet, al-

though the trunk diameter of mature individual specimens can reach massive proportions. This species is most often found inhabiting dry, rugged sites on the slopes or tops of ridges. Possessing a dark colored, deeply cut ridge-and-furrow design, the bark of this tree is very characteristic and cannot be easily confused with other species.

The bark of the chestnut oak has a fairly high content of tannin, a natural product which can be used in the processing of leather as well as in other industries. The wood of this species, a member of the white oak group, is a valuable resource, and its acorns represent an important food source for wildlife.

Although the bark patterns of the white oak (*Quercus alba*) are not as distinctive as those of the chestnut oak, it is not hard to learn its features. Most white oaks are light gray in color and acquire characteristics which appear slightly scaly, despite the tendency of some individual trees to produce more blocky bark textures. Found growing in a wide variety of soil types, the white oak is a large tree which can attain ninety to one hundred feet in height. When grown in open, unrestricted areas, the form of this species is very broad and rounded at maturity. An important timber species, the white oak is cut for many product uses including cooperage and furniture, to name just a few. Several states have also claimed the white oak as their state tree.

Another common oak closely related to the chestnut and white oaks is the northern red oak (*Quercus rubra*). A large tree which normally reaches heights to one hundred feet, the northern red oak grows well in the drained soils of upland areas. The grayish bark of young trees is quite smooth but darkens considerably with age and assumes a roughened texture, especially on the lower trunk. Like the white oak, the acorns of this species are a valuable food source for wildlife, and the wood has many important commercial uses.

In Shady Places

A small, shade-tolerant tree often found growing near creeks in the moist areas of the

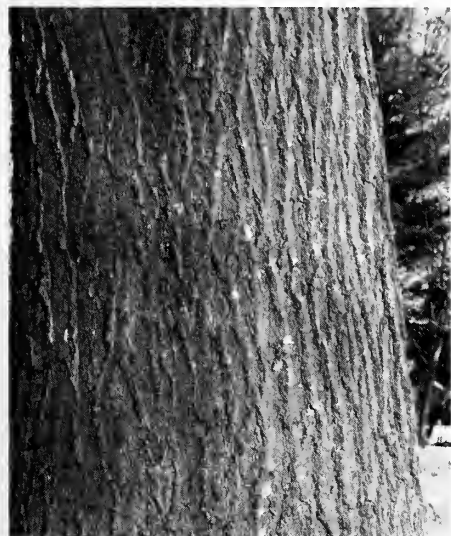
The white oak has flat but scaly bark of a light gray.

forest understory, the American hornbeam (*Carpinus caroliniana*) possesses a very distinctive bark. The smooth, bluish-gray bark is easily recognized and is characterized by long, broad ridges which run perpendicular to the trunk. Even though the wood of this species is not commercially important because of its slow growth and small stature, it is cut, where locally abundant, for firewood.

Another small tree quite common in wooded areas with a distinctive bark pattern is the eastern hop hornbeam (*Ostrya virginiana*). Brownish-gray in color, this species has numerous small strips of bark which exfoliate from the main trunk and provide a very noticeable and pleasing pattern. Better able to tolerate a greater diversity of soil types than its relative, the American hornbeam (both species are members of the birch family), the eastern hop hornbeam is shade-intolerant.

Black Cherry and Basswood

One of the most distinctive and economically valuable woodland tree species is the black cherry (*Prunus serotina*). The bark of the young trees is smooth, reddish-brown in color, and has numerous laterally arranged, lenti-



celed areas (tissues used by the plant for gas exchange with the atmosphere). As the tree matures, the bark assumes a coarse, patchy appearance and darkens considerably. Black cherries can be located on a variety of soil types, although their best growth occurs on moist, fertile sites. The fruit of this species is, of course, a valuable wildlife food source and is sought after by numerous species of birds and mammals. The black cherry boasts beautifully colored wood, highly sought after for a number of uses, especially for fine furniture and veneer.

Basswood (*Tilia americana*), often called American linden, is a large species often maturing to ninety feet or more in height. The bark of the basswood varies in color through the grays and browns, but it often has a reddish tinge when young. As the basswood matures, its vertically arranged, flattened ridges become more pronounced and combine with the previously mentioned colors to make the bark of this species easy to identify with a little practice. Frequently found inhabiting moist, well-drained sites, the basswood has a medium-to-fast growth rate and is browsed by deer. The wood is light in color and weight and is harvested for veneer as well as a number of other uses.

The red oak's bark assumes a roughened, almost diamond, texture with age.



Above, the black locust has dark brown, deeply furrowed bark in an interlock pattern. Below, the tuliptree's flattened ridges when young will deepen with age.



Black Locust, Sassafras, Tulip

The black locust (*Robinia pseudo-acacia*) is a fairly common, fast growing tree which attains up to seventy-five feet of height. The combination of its dark brown color and deeply cut, ridge and furrow, interlocking pattern allows the bark of this woodland native to be easily recognized. At home in a variety of sites, the

black locust grows best in moist areas and matures well in soils of limestone origin. The wood of this species is very durable and is frequently used for fence posts.

The sassafras (*Sassafras albidum*) is a small native species and a member of the laurel family, known for its scented foliage, brilliant orange-yellow-scarlet autumn color, and famous tea (which is no longer recommended because of possible carcinogenic properties). Its brown-colored bark is often tinged with red and is complemented by the characteristic and somewhat flat-topped, ridge and furrow pattern. The sassafras is not overly particular with respect to soil types, but it does prefer a moist site with good drainage characteristics. The September-maturing blue fruit is eaten by many bird species.

The tuliptree (*Liriodendron tulipifera*), also called yellow- or tulip-poplar, is one of our largest native hardwood species. Although it often reaches one hundred feet, it can mature to much loftier proportions. A number of its features are eye-catching, including its flowers, leaf shape, and bark characteristics. Although somewhat light colored on young specimens, the bark matures to a dark, brownish-gray and has an interlocking ridge-and-furrow pattern. With age the furrows become quite deeply cut, and the overall appearance is very coarse. The best growth of this species occurs in moist soils, but good drainage is required. The wood of the tuliptree is used for furniture and many other products.

The identification of trees is only the first step in understanding how they function and enjoying them fully. Winter botany is a fascinating subject requiring time and patience but yielding many rewards. Even though bark characteristics represent only one phase of this study, it is an important and interesting one indeed, which can be pursued casually as family recreation or with great intensity as a lifelong hobby, since the list of available subjects is almost endless. ❧



Potentilla x tongueii

Containing the garden waifs...

A GARDEN FOR URCHINS

Frederick McGourty

Reprinted with permission from BULLETIN OF THE AMERICAN ROCK GARDEN SOCIETY, Spring 1982

When a neighbor's little girl lost her St. Bernard in one of our borders some distance from the kitchen, we knew something had to be done. Gardens, like closets, have a way of attracting clutter, and ours is no exception. Each year my wife and I resolve to cut down on the number and variety of plants we grow, but by February the laudable aim is on the wane as the seed packets begin to appear in the mail.

The trouble is, there are a great number of very fine plants in this world, but garden space is limited, and our own time usually more so. We may very well have on hand all of the ingredients for a pleasing garden, but the plants don't always come together for their best display or for the unity of the garden. In the process of crowding, which a friend calls

sardine-tin horticulture, some excellent plants get buried, often literally, and we never learn the meritorious (or, confess it, occasionally rotten) traits of everything we grow. Possession of a plant does not necessarily imply knowledge of it. Even quite good gardens tend to have their share of wasted plants, the latter being overshadowed by some attractive natural or landscape feature or a few striking plant combinations.

A couple of years ago when it became clear that our garden was developing a mind of its own, and a rather balky one at that, I decided to take corrective measures. A quick look around the borderlands disclosed a number of plants that had no business being in our garden. Many were aggressors, and none had heard of the Helsinki Accord. To the aston-



An excellent small companion plant, *Ajuga* 'Metallica Crispa' has deep green leaves that become twisted with purple as the season progresses.

ishment of wife and anguished cries from plant-collector friends, I carted truckloads of greedy gaillardias, invasive inulas and lustful lysimachias to the village dump, fearing that if I consigned them to the compost heap, they would by hook, crook, or root work their way back to the garden. To all my acquaintances I bellowed, "The only good galium is a dead galium!" Quietly, they said to each other, "Save the scutellaria. He'll come to his senses soon."

The Softening Process

The clean-up continued, and upon peeling off several layers of garden I began to find an occasional, rather attractive little runt, albeit scrawny and malnourished, lurking in the underbrush. One couldn't very well leave it there, for the forest would no doubt return someday when I wasn't looking. And as 'enry 'iggins, looking at Eliza Doolittle for the first time, might have said, "This young damsel has potentialities!" so began my garden for urchins.

But how to evaluate them, how to bring out their best qualities? Plantings in the ground

often become more permanent than the gardener intends, and it didn't seem time yet to cast the urchins in stone; they hadn't even been de-thrippped. To be sure, plants in containers receive much more attention, especially if they are on steps near a frequently used entrance such as a back door, since they constantly provoke a sense of guilt if they are not tended. No person passing by a gasping astilbe ten times a day can avoid the temptation to water. Faucets are also nearby, which is not always the case in the borderlands.

The trouble is, the traditional clay and newer black plastic Zarn types of pots are not particularly attractive. Although some of my earliest memories are of a large greenhouse that my mother had, I for some reason never developed a sentimental regard for gatherings of pots of individual plants. They have struck me as being rather dull and without design, if utilitarian, and when I eventually started my own garden I avoided them in the way that rock gardeners shy from catalpas. They were simply not for me, nor are they now.

There is in fact a wonderful range of con-

tainers on the market, and I developed an interest in those with a broad diameter, so that several plants might be inserted and provide some sort of group display but not a miniature garden. We are not jardiniere gardeners, and redwood tubs, at least on the scale to which I am accustomed to garden, are beyond our means. As a pragmatist, with a bottom to my pocket, I have not been above begging an occasional bushel basket from the greengrocer or combing the housewares division of a discount store for dull brown plastic dish tubs with admirable diameter, the bottoms of which containers I then perforate with an ice pick so they will drain properly. Wife and friends utter a plaintive sigh when I come home from a raid, and my landscape architect, if I were to have one, would scream in horror.

Partners

The growing of plants has always struck me as an aesthetic pursuit, one in which the aim is to get visually—not to mention culturally—compatible partners together and see what happens. In this regard flower color associations play a role, as do the combinations of different floral shapes. Most important, however, is the contrast of foliage, *e.g.*, light and dark, coarse and refined. The reason for this, obviously, is that we live with the foliage through the entire growing season, whereas flowers last usually but two or three weeks. The interesting contrast of certain plant shapes, or growth habits, is another consideration.

With these thoughts in mind, I gradually rounded up my urchins and grouped them on the ground by height and foliage textures. As a rule, and of course depending on plant and container size, I put three plants of one species into a container with three of another. The soil mix, such as it was, was well composted sod and sandy leaf mold, to which several handfuls of peat moss, a dash of dolomitic limestone and a tablespoon of Osmocote 14-14-14 were added per container. This slow-release fertilizer, used in modest quantities to

compensate (and then some) for the leaching of nutrients which occurs due to frequent waterings, is a wonderful development for both plants and gardeners, for it provides an even flow of nourishment at no expense of labor apart from the initial input.

The little urchins thrived, and I came to the conclusion that most, indeed, could be good garden plants, but were just victims of circumstance, trapped and overlooked in a large garden, little fish caught among the barracudas, so to speak. For visitors, at least, they seemed to hold more interest than petunias, and even my wife and old plant-collector friends gave an approving, if grudging, nod. For the smallest plants I used the king size of seedling plastic trays (7 inches \times 16 inches \times 2½ inches), which are shallow and inconspicuous, as a good container should be. Larger plants took pot luck, which as often as not was a rather aged wooden tub with fifteen inch diameter. Around the time when leaves fall from the trees in autumn, I would depot plants and put them into the ground for winter, then give them a layer of pine boughs in early December after the soil had frozen. In a few instances we would put trays in the cold frame. Losses have been quite small.



The feathery leaves and tiny white blooms of *Aruncus aethusifolius*, a goatsbeard, lends refinement to less delicate nearby plants.

Some Sweets, Love

Here are a few combinations with the reclaimed ones: *Astilbe x crispa* 'Perkeo' surrounding *Polygonatum humile* (*P. falcatum* of rock gardeners). This half-pint of an astilbe, with attractive but fleeting pink flowers in summer, is a season-long tactile treat because of its lacy but surprisingly rigid foliage. Don't let the neighborhood kids pet it too often. The polygonatum is a nine-inch-tall, stoloniferous solomon's-seal with sculptured foliage that reminds one slightly of false-hellebore (*Veratrum*). Shade is needed.

Aruncus aethusifolius with *Ajuga* 'Metallica Crispa' in the fore. The little Korean goatsbeard looks remarkably similar to an astilbe but has even more feathery leaves. The floral effectiveness is prolonged because the tiny white blossoms are succeeded by cinnamon-colored seed pods that draw the eye repeatedly. The ajuga, a non-running kind, forms an asymmetrical, congested clump of deep green, savoyed leaves that develop a purplish tint as summer progresses. Flowers are incidental. Shade is beneficial.

Astilbe glaberrima 'Saxosa' (*saxatilis* of American rock gardeners) with *Alchemilla erythropoda*. The former, one of the smallest astilbes, has quite transient light pink flowers in summer, the customary handsome foliage of the dwarf sorts, and a none-too-robust constitution. ('William Buchanan', with white flowers, is a better grower and has foliage as refined.) The latter, a diminutive lady's mantle with leaves only an inch and a half or two inches wide, forms a tidy light-green clump. Its greenish-yellow flowers in late spring are of little account but to the plant. This alchemilla is used effectively in the crevices of a flagstone walk at Sissinghurst. Partial shade is desirable for the combination.

Disporum sessile 'Variegatum', surrounded in a planting tub by *Asarum europaeum*. The first, a plant derived from a Japanese woodlander, can grow eighteen inches tall and form an impressive little colony, as it does in a shaded section of the rock garden at Brooklyn Botanic Garden. However, in central New England the winters provide undue stress for this handsomely variegated fairy-bells, which is one of the last herbaceous plants to start growth in spring. Performance in a container is better

than in the ground, and the subtle attributes of the plant, including even flowers which are variegated, followed by long-lasting blue-black fruit, become evident. The beauty of the foliage, clean green-and-cream spears, is accentuated by the leathery, deep green, rounded leaves of the European-ginger, which serves as a skirt. Shade, of course.

Potentilla tonguei, with *Molinia caerulea* 'Variegata' in the center of a planting tub. The former, a strong-growing trailer with apricot-colored blossoms, flowering sporadically through summer, seems to come into its best here in morning sun and light afternoon shade. The molinia, an ornamental grass with refined creamy yellow stripes, eventually becomes too large for a fifteen-inch container except as a solo, but it is a very slow grower for its first two or three years and is adapted to our purpose. I prefer it to variegated oat grass (*Arrhenatherum elatius* 'Variegatum'), which frequently looks the worse for wear as summer progresses, and to *Carex conica* 'Variegata', a neat diminutive sedge which would consort better with *Ajuga* 'Metallica Crispa' or other plants with small blocky foliage.

Our container combinations are not by any means restricted to rock garden plants, and luck of the season plays its role. For example, in midsummer one year I bought from a garden center a discounted, left-over tray of purple-leaved fennel (*Foeniculum vulgare purpureum*). This can be a splendid plant, with a unique misty texture because of its threadlike maroon foliage. In one of our borderlands there happened to be a small army of seedlings of one of the variegated European hawkweeds, probably *Hieracium waldsteinii*, with light gray leaves and brownish-mauve markings. We decided to combine the two in a ten-inch container. The fennel is a short-lived but rampageous perennial which can do a considerable amount of damage to a border if it is not well attended by the gardener, but container growth kept it restricted to a foot in height, at the same time restraining the hawkweed. The combination was attractive until Thanksgiving. Sometimes it helps to think of a container as a straitjacket.

Oh yes, the St. Bernard mentioned in the first paragraph. We sent a scottie into the border with a little cask of brandy, and after a few hours he ushered out the red-eyed saint, to the delight of the little girl and me. ❧

GERMINATING SEED: ANOTHER METHOD

Reprinted with permission from AMERICAN HORTICULTURIST, March 1982

Bricks, believe it or not, are the secret to keeping freshly sown seed evenly moist with a minimum of fuss says Ralph Balcom in the Fall, 1980 issue of the American Primrose Society Bulletin, *Primroses*.

Primrose seed, like most other types of seed, must not be allowed to dry out after it has been sown, even for an hour or two, or the seed generally will not germinate. Gardeners deal with this problem in a variety of ways—from hourly hand misting to sealing containers in plastic bags to elaborate automatic watering systems, but few systems seem as practical, and as little known, as germinating seed on bricks covered with soil. This idea, says Mr. Balcom, is quite popular among primrose enthusiasts in his area.

To construct a brick-watered container, start first with an ordinary brick, never a glazed one. With old crating or other scrap wood build a box that fits tightly around the sides of the brick when it is lying face up. Since this box or frame will serve to hold the growing medium the seed will be germinated in, it should extend about 1½ inches above the top of the brick.

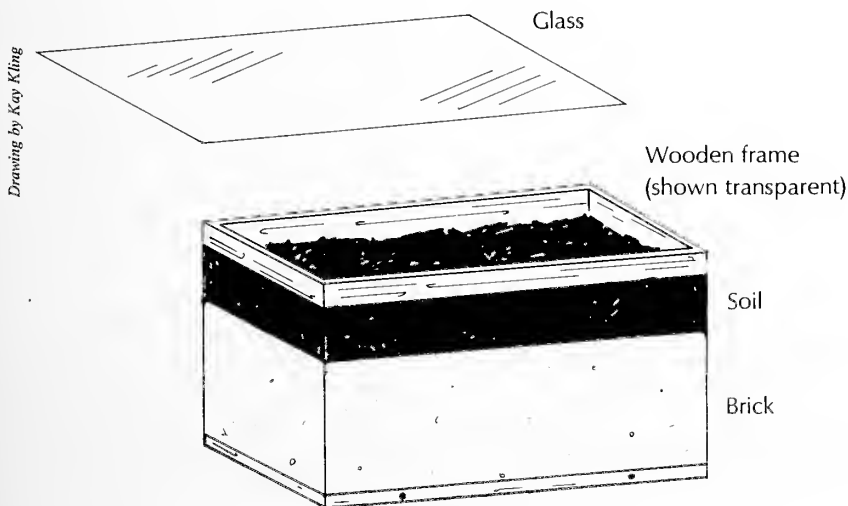
Fit the brick into its frame (if you didn't make the frame with the brick already in place), and make sure it slides all the way to

the bottom so you will have room for soil on top. A nail or two nailed through the frame and extending under the brick will serve to keep the brick from falling out the bottom. Chicken wire staple-gunned across the bottom also would serve the same purpose.

Spread an appropriate germinating medium on the top of the brick to within one-half inch of the top of the frame/container. The medium will vary slightly depending on the seed you plan to sow, but it probably would consist of some combination of peat, sphagnum moss, perlite and/or vermiculite. Since soilless mixtures can be hard to wet, moisten the mixture before putting it on top of the brick.

Spread the seed to be germinated on the medium, and place a piece of glass or plastic over the frame to conserve moisture. If necessary, a sheet of paper will reduce the amount of light reaching the seed.

Set the brick and frame into a shallow pan of water, which will serve as a reservoir. Keep the water level high enough so that it is always touching the brick, but never covering it. Obviously, if the water reaches the top of the brick the germinating medium will become waterlogged, a situation just as deadly to seed as overly-dry medium. ❀



GARDENING WITH LIVING FOSSILS

Frances Gallogly

Illustrations by Laura Louise Foster*

Reprinted with permission from BULLETIN OF THE AMERICAN ROCK GARDEN SOCIETY, Spring 1982

Why grow a plant that never flowers and whose stem is so rough with silica that it will scratch when drawn across a fingernail? The equisetum, or horsetail, is considered an invasive weed by most gardeners, but there are a few species worth having.

I enjoy growing horsetail for their bamboo-like grace and because I agree with the authors of *Wild Wealth* when they wrote: "There are some plants that communicate a sense of history. . . . This plant was in existence in the millennia when the coal measures were laid down and somehow it has survived to the present day, in the company of a few club mosses, ferns, and the ginkgo tree."

The horsetail is the only living descendant of giant trees that flourished in the swamps of the Carboniferous period two hundred million years ago. These trees, called Calamites, grew to nearly one hundred feet, but died out when the climate became drier.

Fossil remains lead us to believe the Calamites formed great jungles beside rivers and lakes and in shallow swamps. They had thick ribbed and jointed trunks, much like modern palms, with branches and leaves in whorls ringing the trunk.

Calamites produced spores in such quantity that some coal deposits, called "cannel" coal, consist predominantly of fossilized spores. A type of cannel coal known as "jet" is cut and polished for ornaments.

The Calamites vanished in the Triassic Period, replaced by smaller species that evolved into the present-day horsetail. Some botanists feel this last remaining relative of

the giant calamite is itself treading the road to extinction.

Horsetails Today

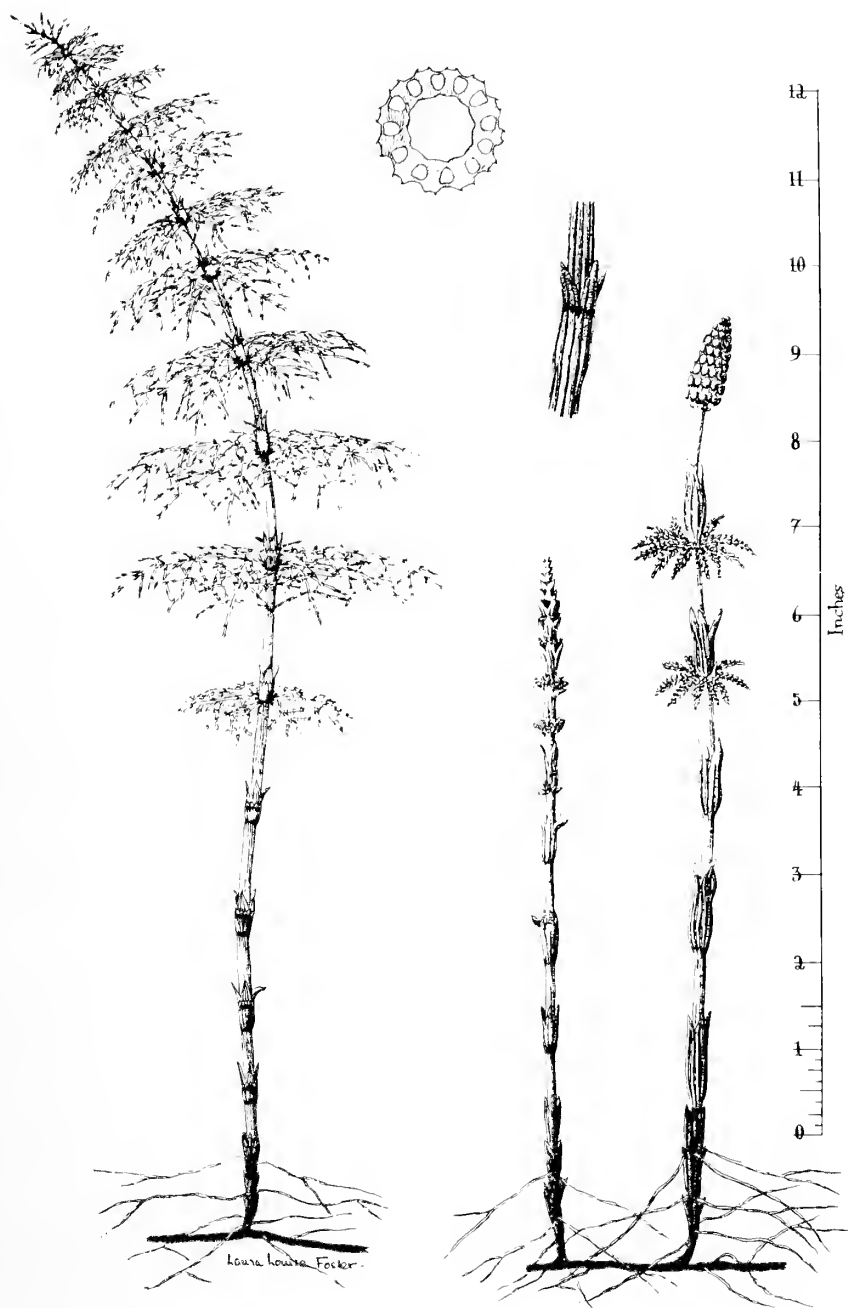
The horsetail is a slender reedlike plant that looks like a diminutive olive-colored bamboo. It thrives in moist gravelly or sandy environments with poor drainage and is frequently encountered as a roadside weed near swamps, in wet meadows, and along railroad embankments. The stems are distinctly jointed and hollow with longitudinal ribs and ridges. At the joints, or nodes, small toothlike leaves appear like papery scales in whorls around the stem. What appear to be leaves are actually branches, also occurring in whorls at the base of the nodes.

There are approximately thirty species of horsetail, of which perhaps ten are found in the United States. Few exceed four feet in height. They range from the tropics to cool temperate zones with the exception of Australia and New Zealand where none are found. Some species are shrubby and one South American species forms a vine that may reach a length of thirty feet.

Some species have two types of growth: a vegetative stem that is green and branched, and a fertile or reproductive stem that lacks chlorophyll and bears a small cone, called a "strobilus," at the tip. Some species bear strobili on vegetative stems and do not send up separate fertile shoots.

These cones contain shield-shaped structures called sporangiophores in which spores are formed. The fertile stems appear in early spring and disappear as soon as the spores are dispersed. Then the more familiar green vegetative shoots emerge. The tiny green spores have four ribbonlike wings called "ela-

*From Boughton Cobb's *A Field Guide to the Ferns and Their Allies*; Houghton Mifflin Co.



Equisetum sylvaticum, the wood horsetail

tors" that coil in humid weather and uncoil in dry air, helping to disperse them. The delicate spores survive only a few days. They germinate on moist soil forming gametophytes the size of a pin head.

A more common type of propagation in horsetail is vegetatively through underground rhizomes that bear fine hairlike roots and, in some species, small bean-sized tubers for food storage. The rhizomes, like the stems, have nodes, grooves, and ridges. It is these deeply-penetrating rhizomes that make horsetails so difficult to eradicate when they become garden pests. Although some chemicals may be effective, the best method to halt their spread may be to improve the garden soil. They do not thrive in well-drained loam.

Horsetails can be a serious problem for farmers and ranchers since they are poisonous to livestock, especially horses. They contain chemicals that destroy thiamine (vitamin B1). Administering doses of the vitamin restores the animal's health except in later stages of the ailment, known as "equisetosis."

Horsetail derives its name from the Latin "equus" (horse) and "seta" (tail or bristle). The most commonly encountered species is *Equisetum arvense* also called field horsetail, scouring rush, horsetail fern, pinegrass, fox-tail rush, bottle brush, horsepipes, and pine-top. The field horsetail will grow under dry or wet conditions and it is the one to avoid planting, as it is the most difficult to control. It is a variable species, and occurs in at least seventeen different forms.

For the Garden

The more attractive species are the feathery branched wood horsetail (*Equisetum sylvaticum*) and the dwarf scouring rush (*Equisetum scirpoides*). Cobb's *Field Guide to the Ferns and Their Allies* describes wood horsetail as the "Loveliest of our fern allies and a truly elegant plant. Emerald green, with delicate lacy branches. . . in well-spaced horizontal whorls, spreading outward and gracefully drooping downward; usually grows as solitary, though closely spaced, little tree." It is found in wet meadows and swamps in rich moist soil and grows about eighteen inches tall.

Dwarf scouring rush, only about six inches tall, is the smallest of the species. It grows in the cool forests and on tundra of the northern

United States, Canada and Alaska in rich moist woods or in tangled mats along mossy stream banks. It looks like horsehair.

Less desirable as garden plants are the swamp horsetail (*E. fluviatile*), shore horsetail (*E. litorale*), marsh horsetail (*E. palustre*), meadow horsetail (*E. pratense*), smooth scouring rush (*E. laevigatum*), common scouring rush (*E. hiemale*), and variegated scouring rush (*E. variegatum*).

Several members of the Connecticut Chapter of the American Rock Garden Society, when queried about growing conditions, recommended planting all horsetails in containers to limit their invasiveness, and in secluded garden locations. (*See note at end of article.*)

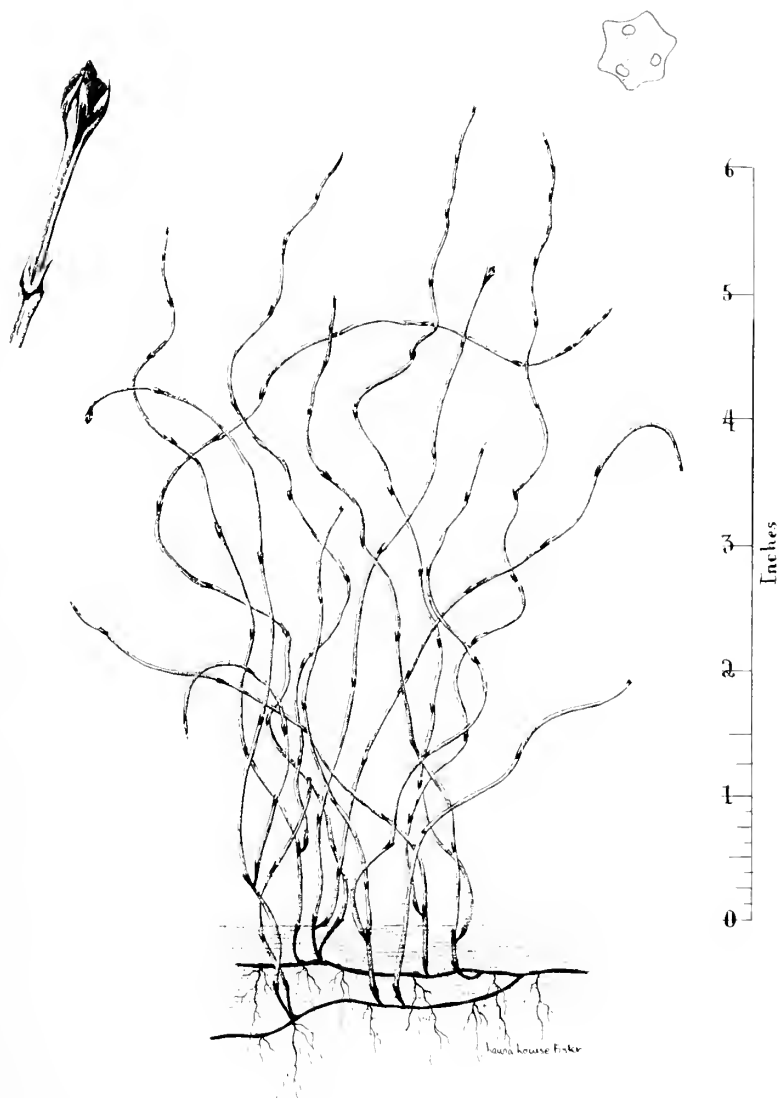
British gardener Gertrude Jekyll planted giant horsetail in a naturalistic pond setting mixed with flowering rush and sweet-sedge. She wrote, "Nothing is more strikingly beautiful than a large patch of *Equisetum telmateia*, a native plant, mysterious, graceful, and almost tropical-looking."

Sears, Becker and Poetker praise flower arrangements of horsetail with *Oenothera missouriensis*, the Missouri primrose. The contrast of the linear reedlike horsetail with the soft rounded form of the yellow primrose makes an attractive combination.

The nodes of horsetail stems contain silica deposits making them rough and abrasive. They are called scouring rush because colonists used the cones and bristlelike branches to scrub metal dishes and pots, especially pewterware, while the rough stems were used as a kind of sandpaper in cabinetmaking. Present day campers who forget their scouring pads in the wilderness, can still use horsetails to clean their utensils.

A few herbal and medicinal uses for horsetail have been recorded. Swamp horsetail was used as a mild diuretic. The crushed stems of other species were used as a styptic or astringent. Combined with other plants in an infusion, horsetail was used to relieve dropsy and kidney ailments. When crushed and boiled in water, the horsetail decoction was believed to promote menstrual discharge.

Today, horsetail serves no economic purpose, but delights the woodland wanderer and rock gardener who cultivate this tiny relative of the giant Calamites as a means of touching base with the ancient lineage of earth's flora. ♪



Equisetum scirpoides, the dwarf scouring rush

As one who has spent many years trying to get rid of *E. arvense* (unsuccessfully) and *E. hiemale* (successfully) by pulling up every sprig of top growth as soon as it appears above ground, I suggest planting all equisetums in deep tubs with very tiny holes in the bottom then sunk in the soil to their rims to prevent the escape of the deep delving underground rhizomes. An exception might be *E. scirpoides* which in our garden has remained a small clump where planted for three years.

Laura Louise Foster

Onward and Upward with . . . Okra?

Popeye loved spinach and popularized the vegetable so that even little boys would eat it, though most of them held their noses. No such luck with okra, which in a poll a few years ago was voted America's least popular vegetable, ranking below kohlrabi. Southerners protest, and it is true that deep-fried okra is a creature quite different from the stewed sort. Prepared in the former way, the pods (fruits) of this cotton relative may not be ethereal, but they are at least slightly above earthy. To some gardeners the creamy yellow flowers with red centers, much resembling a hibiscus (to which okra is also related), are reason enough to grow the plant. Flower arrangers esteem a red-podded variety.

It seems that okra can be as versatile as the soybean. *Ornamental News*, July-August 1982 (Essex County Cooperative Extension Service, Cedar Grove, New Jersey) carries a report by Franklin W. Martin, an Agricultural Research Horticulturist at Mayaguez Institute of Tropical Agriculture, Mayaguez, Puerto Rico. "... in Africa and Asia, okra is a leaf vegetable cooked like spinach. It is high in vitamins A and C, protein, calcium and iron. Mature pods can be cooked and the seeds removed and used as legumes. In El Salvador and Malaysia, mature dried seeds are roasted and ground to make caffeine-free coffee.

"Okra seed oil contains 70% unsaturated fats and could be used in margarine, and a high-protein meal made from the seeds has proved suitable for baked goods. Finally, okra seed can be used to make a vegetable curd, something like soybean tofu.

"However, okra vegetable curd may be a questionable food source unless a toxic pigment, gossypol, can be removed from the ground seed, as is done in processing cottonseed oil. Breeding varieties with seeds that contain little or no gossypol is also possible." ❀



Drawing by Kay Kling

Clockwise from upper left: the mallowlike flowers of okra; ripe seed pods; crosscut pods ready for cooking or coating with batter for deep frying; ripe pods as used in flower arrangements.

PLANTING METHODS ARE CHANGING

Amalie Adler Ascher

Reprinted with permission from *FLOWER AND GARDEN*, April-May 1982

Container-grown trees and shrubs are no longer being planted the way such plants used to be, says Dr. Francis R. Gouin, professor of horticulture at the University of Maryland. But news of the change has been slow to get around.

In the past, roots were deeply buried in the manner of planting nursery stock that was sold balled and burlaped or bare rooted.

Nowadays, more and more plants are being grown and sold in containers. Soil has become passé in container growing. The new growing mixes no longer consist mainly of earth, but contain a variety of combinations excluding soil. They might be bark and sand; peat moss and sand; peat, bark and sand; peat and perlite; or bark, peat and perlite. Plants grow rapidly in these artificial or soil-less mixes if they are well fed and watered.

Consequently, roots are likely to fill a container in one growing season and the plant becomes rootbound. These new methods of commercial growing therefore require different methods of planting.

When you buy a container-grown tree or shrub, Dr. Gouin suggests, turn it out of its pot and examine the root system. If the roots form a mass and encircle the root ball, the plant has been in the pot too long and is pot-bound. Such a plant is nevertheless acceptable for purchase, he says, provided you take remedial measures. In planting it, split the root ball, or in Dr. Gouin's term, "butterfly it."

"Butterflying"

To do this, lay the plant and root ball on its side, and with a digging spade or shovel cut through the lower part of the root ball. Insert the shovel in line with the trunk and slice through the bottom of the root ball to a distance of half way up. Then spread the lower halves of the root ball apart. In setting the plant in the ground, you will now bring the feeding roots, which had grown to the bottom,

nearer the surface where conditions are more favorable for growth.

Dr. Gouin compares the circumstances of ornamentals growing in the ground with those growing in containers. In the ground, feeding roots generally lie in the upper six inches of soil, except for plants like rhododendrons and azaleas whose roots lie in the upper three or four inches. But in plants grown in three-to five-gallon containers, the roots usually will be found at the bottom. Planting those roots at the bottom of the planting hole would have the same effect as burying the roots of an established tree or shrub under ten to twelve inches of soil, causing them to suffocate and the tree to die.

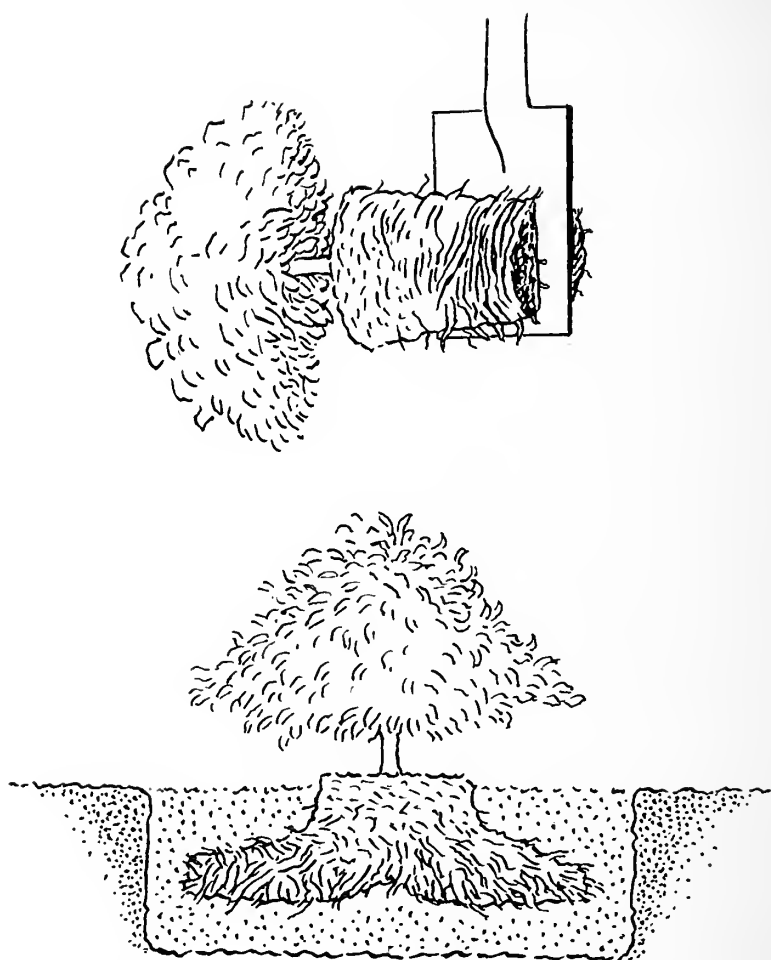
Butterflying the root ball has other advantages. It disengages circling or matted roots, and prunes roots, forcing new lateral roots to develop in the surrounding soil. Butterflying may seem cruel, Dr. Gouin says, but it reduces transplanting losses and helps container grown plants to become better established in the landscape at an early stage. Butterflying is also beneficial to potbound house plants.

Soil Improvement

In planting, improve the soil excavated from the hole before replacing it. Add organic matter (compost, peat moss or milled pine bark) in a ratio of one part organic matter to two parts soil. Also add fertilizer (10-6-4 or a comparable nitrogen, phosphorus and potash formula), one tablespoon per gallon of soil.

In clay soils, use a very fine-textured peat; in sandy soils a coarse peat. Canadian peat is considered fine textured; German and Irish peat (which are hard to come by) are considered coarse. Milled pine bark added to sandy soils will last two or three years longer than peat, which in sandy soil tends to oxidize and disappear in four or five months.

A soil test will determine whether the pH



Slicing the rootball with a flat spade permits the roots to be "butterflied" in the planting hole for better aeration and probable success.

(degree of alkalinity or acidity) is suitable or should be altered. Either lime (to raise pH) or sulfur (to lower) may be added to bring it to the proper level. A pH of 6.5 to 7 is neutral, and satisfies the majority of plants. Milled pine bark, Dr. Gouin says, stabilizes at a pH of 5.3 which is acid, and can accommodate many species. Maples, for example, need a pH of 6.3, whereas rhododendrons and azaleas take a more acid pH of 5.

Mulching and Watering

The planting depth of the tree or shrub is also critical. Allow 10 to 20 percent of the root ball to remain above the ground, Dr. Gouin ad-

vises. And do not go overboard in mulching. Although mulching the surface is beneficial, if done to excess it brings on disease and suffocation, especially when mulch is piled against the stems. Heavy-handed mulching causes azaleas to shrink in size, dogwoods and maples to develop stem canker, and spruce to contract crown rot.

We did not have such mulch problems fifteen years ago when people had less leisure time, Dr. Gouin says, describing the hazards of over-mulching as a "rich man's disease." Do not build up mulch more than an inch or two deep. And don't be too quick to deepen existing mulch. Often all that is needed is to

loosen it lightly with a rake. Where it comes into contact with stems, pull it away. As for mulching trees and shrubs with black plastic, Dr. Gouin frowns on the method. It causes shallow rooting and limits the depth of roots, he says.

Do not depend on natural rain to do the watering of newly planted trees and shrubs, Dr. Gouin warns. Even though you plant it in a downpour, you must still water it with a hose. The force and volume of rain water are insufficient to eliminate voids or air spaces in the soil left in planting. Inadequately watered, a plant will undergo stress, even in the rain.

"It's surprising to see how many sink holes will develop after watering. But don't fill them with mulch—fill them with soil," he ad-

vises. Moreover, do not water until the planting operation is completed, and as you fill in around the root ball, dance on the soil to firm it. Dr. Gouin also recommends tearing open a container such as a peat pot before setting it with the plant into the ground. Many a pot said to rot in the ground does not do so. After watering, then apply mulch.

As a general rule, Dr. Gouin advises planting of oaks, pines, Norway spruce and all other narrow-leaved evergreens except junipers in the spring. If soil is sandy, junipers can be planted in the fall. However, if the soil is heavy, it is better to plant them in spring. In heavy soils, frost action tends to push fall planted container grown plants out of the ground, allowing roots to dry. ❧

Of Daffodils and Such

A great deal of cultivar naming, for better or worse, has taken place in the plant societies in recent years. In 1981, for example, nearly 1,000 "new" daylilies (*Heemerocallis*) made their appearance. Most will make their exit quickly, too, but it is a major source of confusion for the gardener, who can easily be taken in by the name game. Fortunately, a number of the societies from time to time issue lists of cultivars most esteemed by their members. Some of these cultivars are not easy to locate in the trade, but the lists at least provide a standard of sorts.

Daffodils continue to be popular whether they are called daffodils or *Narcissus*, their botanical name. The American Daffodil Society has performed a service by drawing together a list of its top show winners (*The Daffodil Journal*, December, 1981). Blue ribbons go to: 'Stratosphere', 'Festivity', 'Pipit', 'Daydream', 'Geranium', 'Beryl', 'Silver Chimes', 'Cheerfulness', 'Golden Dawn' and 'Panache'. Four miniatures were included: 'Hawera', 'Segovia', 'Xit' and 'Sundial'.

Also concerning daffodils, some recent controlled tests in England at Wisley, the Royal Horticultural Society's Garden, confirmed what gardeners have assumed for years. Daffodil foliage was cut at two-, four- and six-week intervals after bloom. Early cutting caused very bad growth in successive years, late cutting (after foliage had died) brought about a strong future bounty. So, leave the clippers on the shelf and let the daffodils do their own thing. ❧



Voted one of the best, 'Cheerfulness', a double daffodil, has multiple flowers on each stem.



Cryptolaemus larva feeding on mealybug

THE CRUNCHY PLEASURES OF CRYPTOLAEMUS MONTROUZIERI

Allen Lacy

Reprinted with permission from THE WALL STREET JOURNAL, September 25, 1981

I sympathize with people who refuse to grow houseplants on the moral grounds that the things generally perish under their care, leaving them feeling guilty about what happened to the aspidistra or Swedish ivy or African violet they brought home from the supermarket. There's a lot of grief in watching anything you love turn sick and die.

Early this June, it looked like our ancient and beloved hoyo vine wouldn't make it until Labor Day. It was a painful thought. My wife bought it in Virginia in 1962 as a rooted cutting. It has moved with us several times. We

have treasured it for its handsome waxy foliage all year long and for its fragrant, long-lasting clusters of velvety pink blossoms in summer.

But for the last two years it has suffered sorely, being as afflicted with mealybugs as Job was with boils and other woes. An exploding population of lethargic, cottony-gray insects was feeding on its sap, sucking away its life and making it a very sorry sight.

The mealybugs were out of control. They resisted our best efforts to exterminate them by both hand combat (cotton swabs dipped in

rubbing alcohol) and chemical warfare (systemic poisons and a variety of nasty-smelling sprays).

The plant seemed doomed, but then my wife suggested that I call our friend Roger in Boston, a Harvard-trained biologist who is seldom stumped for an answer when it comes to the things that can go wrong with plants.

"Call Rincon-Vitova Insectaries in Oak View, California," he instructed, "and order 100 *Cryptolaemus montrouzieri*."

After some deep silence from my end of the wire, he went on to explain. Rincon-Vitova is a firm that specializes in biological control of harmful insects in house or garden. In other words, it sells bug-eating bugs—lacewings and lady bugs and predatory wasps to gobble up pests like whiteflies, aphids and scale insects. *Cryptolaemus montrouzieri* is a small Australian beetle whose gruesome diet consists entirely of mealybugs. Even its larvae, which are said to look a lot like mealybugs themselves, eat mealybugs. A scientific journal had recently reported that the Des Moines Botanical Center had used these beetles—affectionately known as "Crypts"—to cure a bad epidemic of mealybugs after other means had failed.

It sounded like these little beetles were bugs after my own heart, so I called California and ordered 100 Crypts—\$7 worth. While I was at it I asked the pleasant woman who was taking my order if she had anything for the brown scale insects on our asparagus fern, and she said yes, she'd send along 100 *Metaphycus helvolus*, a parasitic wasp.

While I waited for my purchase to arrive in the mail, I horrified my friends by telling them what I'd done. Our friend Phyllis, who doesn't care very much for anything that stings, said she wouldn't be dropping by very much in the future. I assured her that the wasps didn't sting, but felt a little uneasy myself, since I really hadn't asked Rincon-Vitova about the matter.

The package arrived. The wasps were very disappointing, since they were barely visible to the naked eye. The scale is gone, but the joy in its eradication hardly compared to my

delight in the Crypts and their work. They attacked the mealybugs with visible gratifying ferocity the minute they got out of their ice-cream carton.

They flew right to the hoyia, stalking up and down its stems and leaves on their mission of search-and-destroy. The next morning my wife reported that she had just observed two beetles devour an especially fat victim, one at either end.

In two weeks, the battle was over. With not a single mealybug in sight, I opened a window so my Crypts could look for prey in the larger world outdoors.

The hoyia not only made it to Labor Day, it's also bursting into vigorous growth and loaded down with more buds than we've seen in years. Intrigued by the results of this household experiment of using some insects to control others, I'm thinking about ordering 500 *Encarsia formosa*, a wasp even tinier than the one which disposed of the scale on my asparagus fern. It ought to take care of the whiteflies that have suddenly infested our *lantana* plants.

And finally I have the answer to one of life's more puzzling riddles: *What good are mealybugs?* The answer is simple. They make a fine meal for *Cryptolaemus*. ❧



John Black

The adult lady beetle of *Cryptolaemus*, again dining on its favorite food. The ancestors were imported from Australia in 1892.

You can often get all or part of its value back. . .

IF YOU LOSE A TREE

Reprinted with permission from CHANGING TIMES, March 1982

A runaway vehicle, a bolt of electricity from the sky or the ravages of fire and flood can have the same result—the destruction of valuable trees and landscape plantings around your home. However painful that loss may be sentimentally, it can also be a big financial blow.

Landscaping can add as much as 27% to the sale price of a home. What many people do not realize is that landscape plants have a dollar value of their own apart from the buildings or property as a whole. When trees and shrubs on residential property are damaged or destroyed, the loss can frequently be recaptured in whole or in part through an insurance claim or as a deduction from federal income tax.

How Much Is It Worth?

How do you determine your financial loss? The way is to seek the advice of a professional arborist or landscape appraiser, who will undoubtedly make use of the technical manual *The Guide for Establishing Values of Trees and Other Plants*, prepared by the Council of Tree and Landscape Appraisers.

A tree or shrub's worth depends on four key factors.

Kind. Trees that are hardy, durable, attractive, adaptable and relatively maintenance-free are obviously worth more than those that are not.

Size. Some trees and shrubs are small enough to be replaced, and their value can be determined easily. Trees too large to be replaced (those over 12 inches trunk diameter, measured four and a half feet above ground level) are assigned a basic value of \$18 per square inch of the tree's cross section.

Condition. Structural weaknesses and physical defects decrease the value of a tree. These could include weak crotches, dead branches, insect or disease damage, or overgrowth.

Location. A tree or shrub that adds aesthetic value, casts cooling shade on the house or screens out the highway will be worth more than the same tree in a wooded area.

To see how those factors affect value, take

a look at some specific trees and shrubs. Small evergreens, trees up to 12 inches in diameter and most shrubs can be readily transplanted, so their worth is determined by replacement value. (Prices for plants and labor vary from one part of the country to another.) The basic replacement cost of a flowering cherry six inches in trunk diameter, for example, could range from \$660 to \$780. That same kind of tree could have a basic value as high as \$2,400 if it measures 12 inches in diameter.

Appraisers use a system of formulas and tables to determine a tree's value. A tree is never appraised at 100% of its basic replacement value; rather, it is assigned percentages for its species classification (taking size into account), its condition and location. For instance, a ten-inch red maple with a basic value of \$1,600 might get 90% for its species, 80% for condition and 94% for location. The appraised value would then be figured as $\$1,600 \times 90\% \times 80\% \times 94\%$ —a value of \$1,083.

Appraisals of trees over 12 inches in diameter become more complex. A 32-inch sugar maple would be valued higher than a silver maple of the same size because the latter has known structural weakness. A white oak 32 inches in diameter might be appraised as \$12,000 if perfect and perfectly located, but because few trees are, a more likely appraisal might be \$9,000 or less.

Protecting Your Investment

Plan wisely when adding trees or shrubs to your home grounds; consider the type and ultimate size and location. Keep records and receipts. Protect and preserve your investment by correcting insect and disease problems if they occur and having any corrective pruning done when plants are young. Take photographs of the plants as they grow so that you can make before-and-after comparisons.

If your plants suffer damage, consult your homeowners insurance policy to determine the coverage you have. Contact the insurance company and arrange to have a professional appraisal made. If you want a second opinion

or an independent appraisal, consult the Yellow Pages under "Tree Service," "Nurserymen" or "Landscapers." Once replacement has begun, keep a record of all replacement and repair costs for insurance, legal and tax purposes.

The typical homeowners insurance policy provides coverage for damage or loss to trees due to such events as fire, lightning, explosion, riot, civic commotion and malicious mischief. Damage from wind, tornadoes or hurricanes is generally not covered unless the tree damages a building or other property structure; the structure is covered, but the tree is not.

Compensation for Your Loss

The Council of Tree and Landscape Appraisers has been trying to get the IRS to accept the appraisal value of irreplaceable trees and shrubs in cases of damage or destruction. Meanwhile, all but a few states have accepted \$500 as the maximum insurance loss per plant; the maximum was \$250 only a few years ago.

If a tree is damaged or destroyed in a vehic-

ular accident in which the property resident is not the driver, the auto insurance in most cases will pay the appraisal amount up to the limit of the driver's policy coverage. Your homeowners policy will likely pay the remaining cost up to its limit.

The amount of appraised loss or repair cost not covered by insurance is usually an acceptable casualty loss deduction on income tax returns to the extent that the loss exceeds \$100. Competent appraisal is your best evidence of the loss, according to the IRS. The cost of repair and replacement is acceptable as evidence of loss, provided you can show that the damage caused a decrease in the total value of the property and that the repairs were necessary, reasonable in amount, did not exceed the actual damage suffered and did not raise the property value.

For more information, contact the Council of Tree and Landscape Appraisers, 232 Southern Bldg., 1425 H St., N.W., Washington, D.C. 20005. Two free pamphlets, *Tree Values* and the *Tree Casualty Puzzle*, are also available from the council. Send a stamped, self-addressed, business-size envelope. ♣

Toward Weevil Control

Weevils have made life rough for rhododendrons in recent years, the adults feeding on the leaves, the larvae on the roots. One of the most common in the Northwest despite its name, is the obscure root weevil (*Sciopithes obscurus*). Rhododendrons with glandular scales on their leaves (lepidotes) are generally resistant to such feeding, and rhododendrons without the scales (elepidotes) are generally susceptible. Robert P. Doss, a plant physiologist at the USDA's Agricultural Research Service, Puyallup, Washington, along with researchers from the University of Washington (Seattle), has isolated a chemical compound from the resistant rhododendrons. It is called germacrone, and it puts weevils on the run. That includes the black vine weevil, too, another major pest. Eventually germacrone may serve as the base for a slow-release biological repellent to be applied in home gardens, but that is a way off. ♣

The black vine weevil. The grubs attack rhododendron roots while the adults chew notches in the leaves.



L. M. Vanden

To cut down on insects and diseases try...

APPLE BAGGING...IT DOES THE JOB

Robert V. Fischer

Reprinted with permission from THE GARDENER (Men's Garden Clubs of America), May-June 1982

For the sixth consecutive year, if memory serves correctly, the apples to be subsequently turned over to Carol Jean from our backyard garden will be going into plastic bags sometime in early- to mid-June. On the tree, that is. Memory is tricky, but I believe credit for the idea should be attributed elsewhere.

The time to bag varies from year to year, depending on the progress of the season. The benefit of placing one-pint freezer bags over apples in the early stage of their development is that from that point on they are protected from insects and, to a considerable extent, from fungal diseases.

How To Do It

In practice, the bottom corners of the transparent plastic bags are cut off about an inch each way, to allow for drainage, so that when it rains the bags won't fill with water running down the limbs and stems. As shown by the dotted lines in the sketch, a one-inch cut is made so that the amount removed will allow

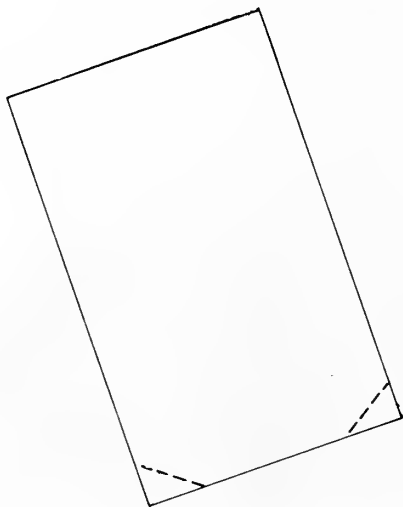
for drainage in the type of freezer bag that has the sides folded in. Bags without the tuck, of course, won't need as much removed. One would believe that to open the corner of the bags would permit entrance of the harmful insects, but that is not so. Occasionally, one will observe a bag in which gnats have taken up residence, but they are harmless.

To place a bag over an apple, open it and draw the neck of it up around the stem of the apple. Then wrap a wire tie around the neck of the bag and the stem to hold the bag over the apple, leaving one end of the tie free to allow for easy removal. If done before the June drop, that time when apple trees automatically thin their crop, you can thin the apples yourself to one every six to eight inches, which will give good size. If smaller apples are desired, reduce the spacing. Usually, very few apples will drop after thinning and bagging, depending on variety. Apples bagged when too small will generally drop, depending upon variety, but this is only a general rule.

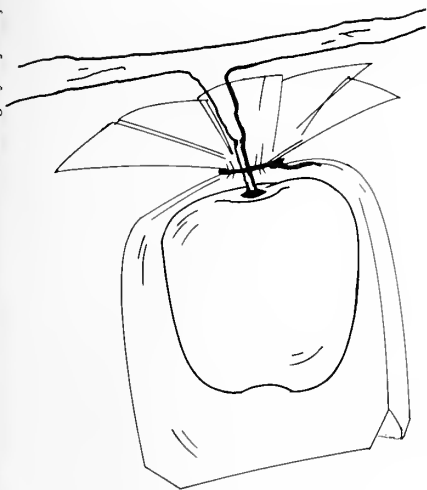
The Results

What are the results? If properly done, you will get apples such as you have never before seen on your own trees. They will be well colored and without a blemish. Bagging doesn't inhibit coloration, and if the blossoms have been well pollinated, they will be well filled-out. (We maintain two hives of bees for that purpose.) Lop-sided apples, it might be mentioned, are usually that way because of poor pollination.

Pears? Yes. You can bag pears, too; but make certain you pick them before they start ripening in the bag. It is standard practice



Cutting off the corners of a freezer bag permits drainage of any water



The bag in place around the apple. The fruit is protected from most insects and fungi.

anyway to pick pears when green, to prevent core rot, but they rot even quicker in the bags.

One other point. Some of the soft-fleshed early apples will split in the bag, possibly due to retention of the natural ethylene gas which triggers fruit ripening. At our home that concerns us not, because these apples are destined for pies, for the freezer and for apple-sauce. The later-ripening apples, the long keepers, never split. They come out of the bags in high color and ready for a long sojourn in the refrigerator.

Buy the bags soon, as they can get scarce when the canning/freezing season gets underway. Before bagging, follow a regular spray schedule. ♣

Bushels from Bags

Reprinted with permission from THE AVANT GARDENER, April 1982

The March issue of a vegetable growers' trade magazine featured fifteen color photos of vegetables growing in plastic bags. Excellent—often spectacular—growth and yields result from the "pillow pak" or "grow-bag" method developed over ten years ago by Dr. Raymond Sheldrake, then a professor at Cornell University and now owner of a research center (806 Elmira Road, Ithaca, NY 14850).

The bags can be made by stapling, taping or sewing colored polyethylene film into a tube or pillow shape and filling this with soilless mix. They're also now available as Plant 'N Bags (W.R. Grace & Co., 62 Whittemore Avenue, Cambridge, MA 02140), containing Terra-Lite mix and starter fertilizer.

The bags are laid flat or hung vertically indoors or outdoors, with vegetables or flowers sown or planted in slits or holes cut in the plastic. They should last two years if made of 4 mil to 8 mil plastic, and are ideal for patio, balcony and roof gardens, concrete backyards, and even windowsills and walls.

Superior growth and yields are due to the medium's better aeration and drainage and its sterility. As Dr. Sheldrake says, "When we grow peppers and eggplants in bags we really cannot believe the growth and yields. For once we have the terrible 'root nibblers' (verticillium, fusarium and nematodes) under control." Also, because the bags absorb solar heat, the growing season is extended.

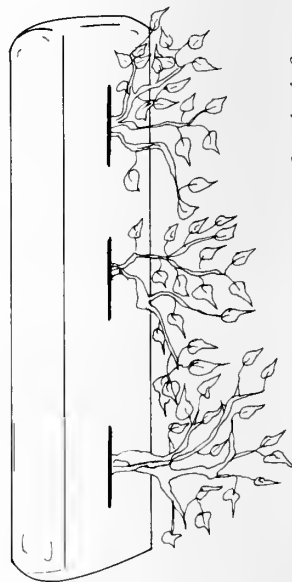
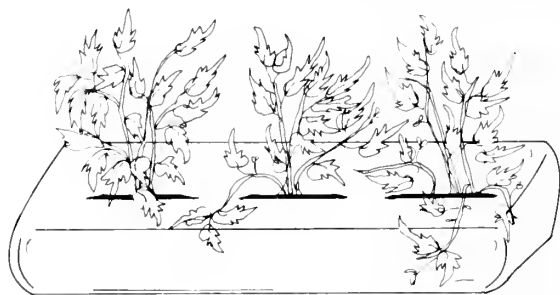
Watering is greatly reduced since water loss is negligible. A few small drainage holes in the bottom will prevent overwatering. For automatic watering, a spaghetti tube system is useful, and the plants can be fed dilute fertilizer in every watering, or weekly with a formula such as

20-10-20, 1 ounce to 2 gallons of water. Some growers incorporate slow-release fertilizer into the mix.

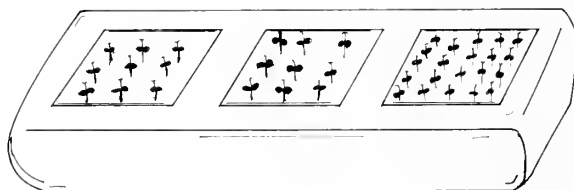
All sorts of crops do well in the bags—lettuce, parsley, “celery and onions do just as well as they do on a well-fed muck soil,” “potatoes grow like weeds,” “sweet potatoes make a great vining hedge if you give them some wire fence,” peanuts, yellow and zucchini squash, cucumbers on string trellises 8 inches to 10 inches high. For direct-sown crops such as carrots, beets and radishes, Dr. Sheldrake cuts out a few large “windows” in the bag and leaves a “belly band” across the middle to hold the bag together. The dwarf and miniature forms of many vegetables are good for smaller grow-bags.

Some additional tips from successful bag growers: be sure to moisten the mix thoroughly before planting...sow seed in a little ball of damp sphagnum moss placed in the planting hole (speeds germination and prevents damping-off), and use some moss as a mulch around the plants...when transplanting, water with a vitamin-hormone preparation such as SUPERthrive (Vitamin Institute, 5409 Satsuma Avenue, North Hollywood, CA 91603) for fast and vigorous growth...to support large vertical bags for deep-rooted crops, put a stake down through the bag into the ground...a funnel is useful for watering...when planting in hot weather, keep the bag in shade for a week or so before giving it full sun...try some unusual plantings such as alpine strawberries, flowering bulbs, and flower-herb-vegetable combinations. ❀

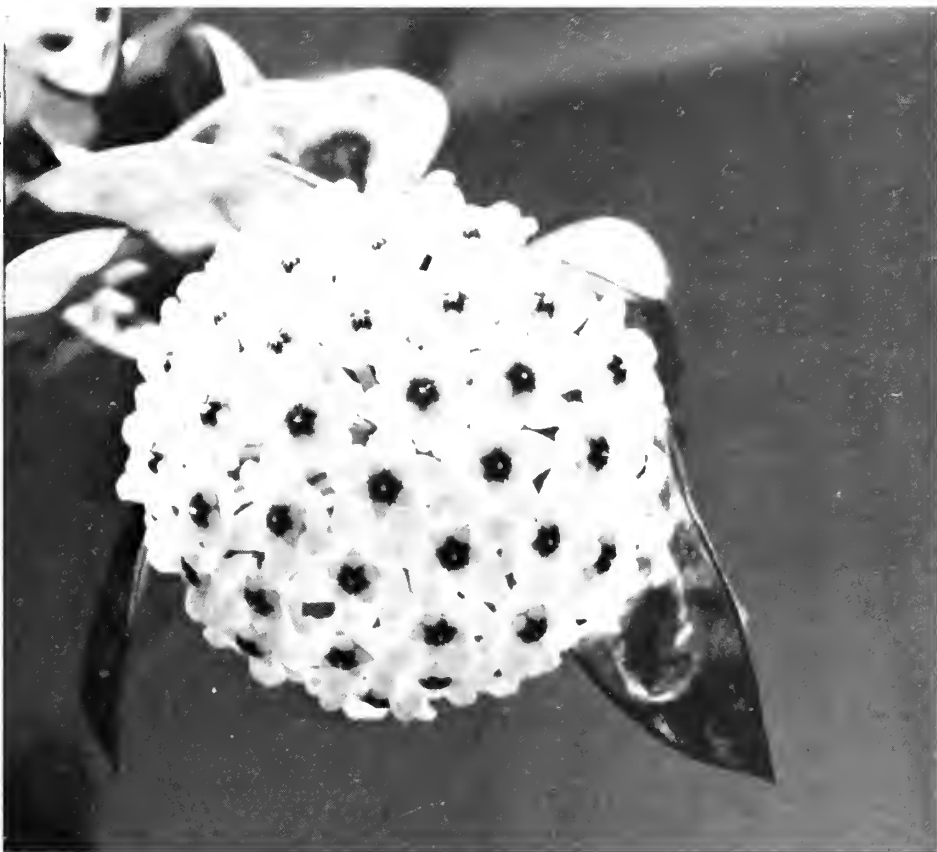
Colored polyethylene film, stapled, taped or sewn into tubes then filled with soilless mix can be used for patios, roof gardens or walls. A few holes in the bottom aid drainage, although watering is much less than with conventional containers.



Drawings by Kay Kling



Above, the “pillow-pak” for climbers; above left, slitted and used for transplanted young stock; below left, larger openings for direct seeding.



Bloom cluster of Hoya 'Krinkle Kurl', a "cold hardy" houseplant.

HOUSEPLANTS CAN TAKE THE COLD

Wallace S. Lipton

Reprinted with permission from ORGANIC GARDENING, October 1982

I have a huge collection of house plants, even though I live in a small New York apartment. A glassed-in terrace—sunny but unheated—is what keeps my collection growing. If you have a front porch or even a lot of window space, there's no need to cosset your plants with expensive lights, humidifiers and heat. Save those lights for vegetable production and give your houseplants a Spartan regime that will let you keep as many as you want without extra cost or trouble. I favor plants that thrive and even flower in cool conditions,

but I keep many tropicals and subtropicals in cold storage as well. I've learned in twelve years of growing that many plants are tougher than they seem.

My system doesn't allow me to display all of my plants in picture-perfect fullness whenever I wish. To do that would require heavy dependence on artificial light and heat in winter. But in any week of the year *some* of my plants will be in their glory. There is an ebb and flow to the seasons in my sunlit plant room, and the change is gratifying.



Flowering maple (*Abutilon pictum* 'Thompsonii') is moderately hardy, tolerating temperatures into the 40s.

The Method

Briefly, here's what I do. Before the cold weather comes, I give plants time to acclimate to conditions on the patio. I feed and water much less in the cold months, and I mist plants only in the morning. When intense cold brings the threat of a freeze in the plant room, I leave the door to the apartment ajar. The terrace must never freeze. When winter's over, I rejuvenate any cold-bedraggled plants with some simple propagation techniques.

In a room too cold for human comfort, where temperatures dip to the low 40s at night, many common house plants lose their vigor and beauty. Too bad, but no tragedy. African violets will stop growing or forming buds. Most types of philodendron suffer noticeably. Wandering Jews will take on a duller hue and lose some leaves, and the purple passion vine will droop.

By late winter there are some bare stalks and long vines tipped with puny leaf clusters on my enclosed terrace. But the longer days and milder weather spur new growth. All of these plants and more can be revived in spring with radical surgery. By rooting cuttings of Swedish ivy, purple passion plant, wandering Jew, pothos and viny philoden-

drons, I soon have well-filled, vigorously growing pots of youthful-looking plants. While colorful beauties like begonias and coleus also root easily, I can renew the parents by cutting them off near soil level and letting them regrow. This technique also works for zebra plant, dieffenbachia, peperomia and the prayer plant.

Some plants come through a cold winter unscathed. The screw-pine (*Pandanus*), sansevieria and yucca are nearly indestructible. Other very good risks have been the asparagus ferns, spider plants, rosary vine and aspidistra (the cast-iron plant).

Now, some really good news. If most tropical and semitropical houseplants survive on a chilly porch, there are others that flourish. My bitter-cold cement sills, where water froze last Christmas, are perfect for small desert cacti and succulents. Mine have survived many winters on one watering a month. An essential precaution: Never let foliage touch frigid window frames or glass.

A little farther from the window, piggyback (*Tolmiea menziesii*) thrives, and strawberry begonia (*Saxifraga stolonifera*) even produces fresh runners. Ivy (*Hedera*) prospers year in, year out, free of the spider mites brought on by the low humidity and high temperature of the average household. Norfolk Island pine (*Araucaria heterophylla*), *Pittosporum tobira* and *Podocarpus macrophyllus maki* have gradually become densely branched shrubs or trees. Citrus trees, hoyas (wax plant), and Jerusalem-cherry (*Solanum pseudocapsicum*) remain beautiful throughout very cold winters. Above all, many tender true ferns, normally among the most exasperating houseplants, suddenly turn docile and easy. Once moved far from drying radiators or registers, they take severe cold and almost any other affront, short of failure to water.

Newcomers to low-temperature gardening will also be surprised by the number of winter-flowering houseplants. Again, cold becomes an advantage when you select plants that prefer it. Fall coolness helps the Thanksgiving, Christmas and Easter cacti set buds. Set them in a chilly place and the buds will open slowly. No coddling is necessary to elicit weeks of cold-weather bloom from azalea, florists' cyclamen, freesia, Cape-cowslip (*Lachenalia*), apostle plant, (*Neomarica*), oxalis and fairy primrose (*Primula malacoides*). Other promising candidates are calceo-

laria (pocketbook flower), camellia and cineraria. These plants all thrive in 45° to 55°F. Oxalis and camellia do fine with cool nights but need day temperatures of 65° to 70°F.

A Porch

A cool porch is almost ideal for forcing the spring bulbs. The most dependable are daffodil, hyacinth, muscari (grape hyacinth), *Iris reticulata* and crocus. Pot up the bulbs and water them well. Store them for the rooting period in a closed carton, insulated with newspaper and placed in a cold corner. Check them once or twice and water if necessary. Ten to 16 weeks later, move the root-filled pots out of the box to a half-bright, very cool spot for two weeks. Next put them in full sun until the buds show color. For flower opening they should go back to a half-bright spot. The dimmer and chillier the location, the longer the blooms will last.

Temperature varies in different parts of my enclosed terrace, and I take advantage of the "microclimates." Since the outer walls, sills and floor are coldest, I winter sensitive figs, palms and the cordyline-dracaena-pleomele clan just outside the openings to my heated rooms.

Temper extremely cold nights by keeping doors and windows to adjacent rooms wide



Boston fern (*Nephrolepis*) like many of the true ferns will readily tolerate sustained temperatures in the 40s during the winter.

Below, cyclamen (*C. persicum*) blooms well on a cool-temperature porch. It frequently aborts its buds and flowers in the heat of a normal house.



Plants to Grow on a Cold Porch

Cold-sensitive

(Need temperatures above 55°F.)

African violet
Anthurium
Codiaeum (croton)
Crossandra
Episcia (flame violet)
Fittonia (nerve plant)
Hypoestes (freckle-face)
Maranta (prayer plant)
Philodendron

Cold-sensitive

(But can be wintered on porch near heat source)

Cordyline
Dracaena
Ficus
Palms
Pleomele

Moderately hardy

(Can take temperatures in the 40's)

Abutilon (flowering maple)
Aglaonema
(Chinese evergreen)
Aphelandra (zebra plant)
Ardisia (coralberry)
Asparagus ferns
Aspidistra (cast-iron plant)
Begonias
Ceropegia woodii
(rosary vine)
Chlorophytum
(spider plant)

Coleus

Cyperus (umbrella plant)
Dieffenbachia (dumb cane)
Gynura (purple passion vine)
Impatiens
Myrtus communis microphylla
(dwarf myrtle)
Pellionia
Peperomia
Plectranthus (Swedish ivy)
Punica granatum nana
(dwarf pomegranate)
Rhoeo (Moses-in-the-cradle)
Scindapsus (pothos)
Streptocarpus
(Cape primrose)
Syngonium (nephthytis)
Viny philodendrons
Wandering Jew

Cold-hardy

(Prefer winter temperatures in the 40's)

Araucaria heterophylla
(Norfolk Island pine)
Cacti
Chives
Citrus trees
Grape ivy
Hedera (ivy)
Hoya (wax plant)
Kangaroo vine
Pandanus (screw pine)
Pittosporum tobira
Podocarpus macrophyllus maki
Sansevieria (snake plant)
Saxifraga stolonifera
(strawberry begonia)

Scilla violacea

Solanum pseudocapsicum
(Jerusalem cherry)

Succulents

Tolmiea menziesii

(piggyback)

True ferns:

Adiantum
Asplenium
Cyrtomium
Davallia
Nephrolepis
Pellaea
Platynerium
Polystichum
Pteris

Yucca (Spanish bayonet)

Cold-hardy flowers

Azalea
Calceolaria
(pocketbook flower)
Camellia
Clivia (Kaffir-lily)
Epiphytic cacti
(Christmas, Easter, etc.)
Cyclamen persicum
Freesia
Lachenalia (Cape cowslip)
Neomarica (apostle plant)
Oxalis
Primula malacoides
(fairy primrose)
Senecio cruentus
(cineraria)
Veltheimia

open. Don't let the porch freeze. On a bright day, an unheated but tightly-insulated porch may grow too hot for plant health by mid-afternoon. So let the excess into inner rooms and save on daytime fuel.

Place plants on the porch no later than October so they can acclimate as the temperature drops gradually. Even heavy drinkers in well-drained clay pots need daily watering only during warm, sunny stretches. With growth arrested by cold, all plants consume less than usual, so watch out for waterlogging and rot. Use porch-temperature water (or a bit warmer) early in the day. Fertilizing and misting are usually unnecessary and may cause damage.

For most plants in such a glassed-in porch, nearly all the year's growth occurs in the warmer months. But that period is much longer than the summer outdoors. October and November mean plants at their newly-attained maximum size, still in the prime of maturity. If late fall and early winter bring a dulling of brilliance and some losses, they also bring some flowering and anticipation of more. By mid-January, the ferns are unrolling their first new growth, and the spring bulbs will soon follow. The cold sunporch, unlike the fully-heated greenhouse, is a place that approaches the outdoor garden's seasonality. It puts the gardener into closer step with nature's rhythms. ♀

UNDERSTANDING SOIL STRESS

Terry A. Tattar

Reprinted with permission from AMERICAN NURSERYMAN, May 15, 1982

Soil is probably the most important environmental factor controlling tree health. The physical and chemical properties of a soil are very important to all of the plants growing in it.

Woody plants become established naturally in soils that are most favorable for survival. However, shade trees are frequently transplanted, which raises the possibility for problems. Presumably the trees are started in soils that are favorable for good growth, but the ones into which they are transplanted may or may not be suitable.

Species selection is usually based on the preferences of the tree planter, not on the plants' adaptability to the soil. When such is the case, soil stress can occur if either or both the physical and chemical properties are unfavorable.

Important Considerations

There are two important points to consider with soil. One is that there is often considerable interplay between the physical and chemical properties of a soil. A change in one of them could bring about a change in the other.

It is also important to remember that man can have tremendous impact on the condition of a soil. His actions can alter or disturb it, bringing about changes in its physical properties, its chemical properties or both. For example, most urban and suburban soils, especially along streets, have been disturbed and are unsuitable for growing shade trees.

To prevent physical and chemical soil stress, one needs to know what causes these problems and take the necessary steps to guard against them. Some of the more common ways stress occurs are discussed below.

Physical Soil Stress

To understand physical soil stress, one must know a few things about soil structure and texture.

The closer one looks at soil structure, the more complex it becomes. A typical soil is composed of several layers. For example, there are usually four layers in a forest soil (see p. 54). The surface layer (Layer A) is composed of rotting leaves and other decomposing organic matter, a sort of natural mulch. Below this is a layer of topsoil a few inches thick that is rich in decomposed organic matter (Layer B). Then comes another relatively thin layer, which contains mineral soil with little organic matter (Layer C). Another layer of soil is below this (Layer D).

A tree's roots usually grow out in the layers of soil near the surface rather than down into the deeper layers. The roots must grow and work in Layers B and C; Layer D contains few roots. The top twelve inches of soil, primarily Layers A and B, contain the feeder roots. This makes this portion of the soil structure the most biologically active part.

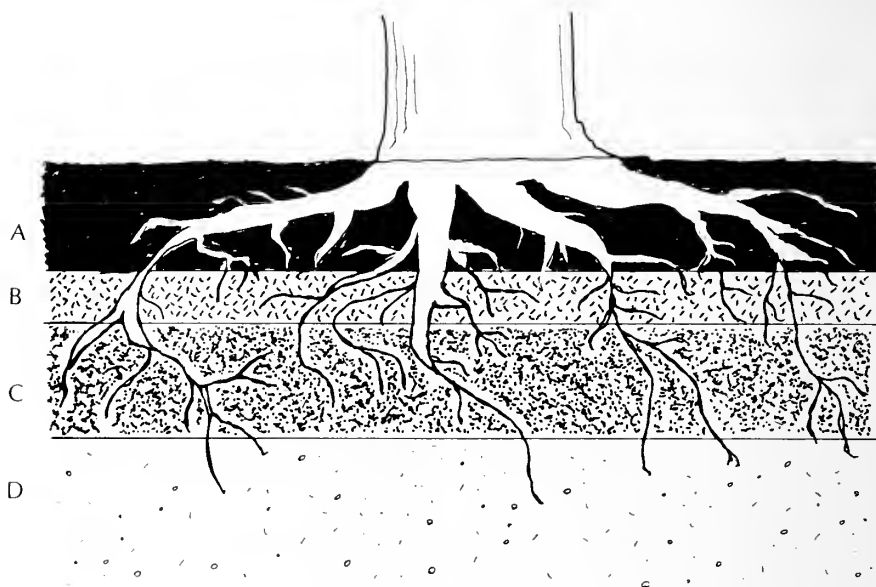
Thus it is easy to see how fragile the root environment is. Disturbances to this delicate balance could result in stress.

Soil Texture

Soil is also classified by the sizes of the particles that compose it. The smallest particles are clay, the medium-sized ones are silt, and the largest ones are sand. Clay, silt and sand are the major mineral components of soils. Their relative proportions account for much of a particular soil's physical characteristics.

In general, sandy soils are light and drain well, while clay soils are heavy and hold water. A proper balance of these components is best for tree growth. Soils that drain too well are usually prone to drought and poor in nutrients, while heavy soils are often anaerobic and too compact for root penetration.

Another key textural component is organic matter. This tends to separate soil particles,



Support and feeder roots are concentrated in the upper two layers of soil where the greatest number of nutrients and the better aeration are found.

encourage gas exchange and biological activity, and permit easier root penetration.

Disturbed Soils

A disturbed soil is one that has been altered from a forest or field condition. For the most part, disturbed soils have been altered by the disruptive activities of man.

Naturally, the topsoil is disturbed most often, usually with serious consequences for trees. Many urban and suburban soils contain little if any topsoil. This is due largely to the removal of all or most of the topsoil during construction, a common practice for many years. When the work was finished, only a very thin layer was put back. The rest was sold off.

In addition, soil structure is altered by earth-moving equipment used in excavation and trenching. Abundant subsoil fill from these activities is often mixed into the surface soil. Most urban and suburban soils near buildings and roads have been so altered that they bear little resemblance to the soils in nearby forests and fields. These soils are

usually hostile root environments for transplanted trees and shrubs.

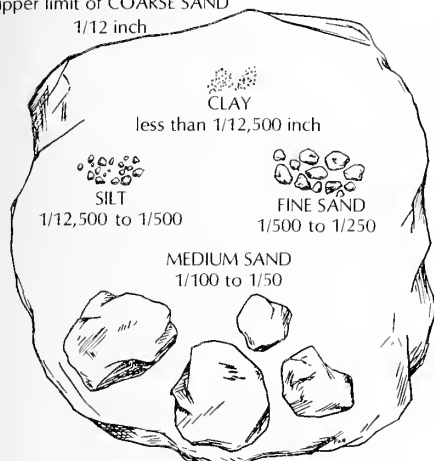
Disturbed soils are most often low in organic content, hindering biological activity. They are also dense, a result of disrupting the soil porosity and adding subsoil clays.

Root Girdling

Root girdling or root strangulation is a common problem of many shade tree species. The exact cause of this is still a subject of debate among tree scientists. But there is some general agreement that conditions that restrict root growth cause roots to grow around the trunk instead of outward from the tree.

It does not appear that restrictions caused by sidewalks and curbs are the major culprits. Girdling roots are common in back and front yards far from any road or building. A recent study¹ showed that the occurrence of root girdling was not related to the width of the tree belt. Another finding of this study was that surgical removal of girdling roots, as has often been recommended, does not improve tree health. Twisting

Largest particle represents
upper limit of COARSE SAND
1/12 inch



Relative sizes of soil particles

the roots during planting also does not seem to be a major cause of root girdling².

One theory contends that root pruning may contribute to the formation of a circular root system that leads to girdling. This is ironic, because root pruning is done on many types of nursery stock to create a compact root system to ensure minimum injury during transplanting. Yet this practice could also cause the tree to die.

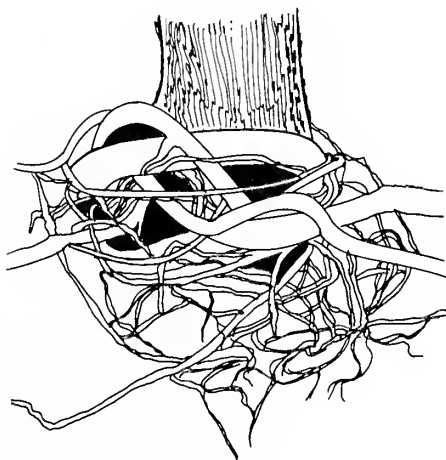
Another theory is that dense soil texture

around the edge of a planting hole prevents roots from growing into the surrounding soil. As a result, the roots turn as they do at the sides of a pot or container.

Both theories are probably correct and account for much of the root girdling that occurs on shade trees.

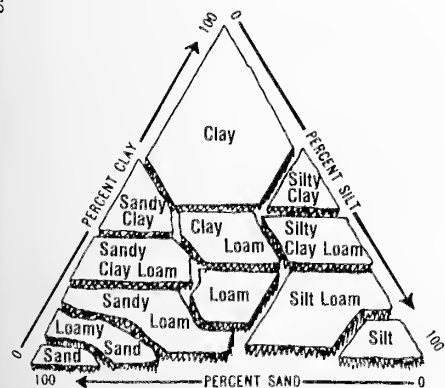
Chemical Stress

Most forest soils contain the correct balance of essential minerals needed by indigenous trees. Shade trees on home properties are almost always transplanted, however, and they may not be well adapted to the soils into which they are placed.



Kay Kling

Roots can assume a girdling growth pattern from a container or from a resistant native soil.



Percents of sand, clay or silt in various soils

In addition, soils around trees are often modified in ways that make some nutrients unavailable to the roots. This can result in deficiencies. Soils may also be modified by adding high concentrations of minerals around the root zones. This can result in nutrient toxicities.

Essential nutrients can be placed into two broad categories: (1) macronutrients, which are calcium, magnesium, nitrogen, phosphorus, potassium and sulfur, and (2) micro-

nutrients, which are boron, copper, iron, manganese, molybdenum, zinc and possibly other trace elements.

Macronutrients are needed by woody plants in relatively large concentrations; they are usually applied in amounts expressed in pounds per inch of stem diameter. Micronutrients are only needed in small amounts; their applications are usually expressed in parts per million.

If any of these essential nutrients is present in abnormally high or low concentrations, plant growth suffers. Severe injury can occur if the abnormality is not corrected.

Fertilization

Fertilization is one of the most common arboricultural practices. The common macronutrients in most fertilizers are nitrogen, potassium and phosphorus. They are added around tree roots to achieve continued growth and to maintain vigor.

Annual fertilization is recommended for most shade trees, because they often receive insufficient amounts of these essential elements from their environment for ideal growth. One researcher has concluded that the urban environment does not allow substantial recycling of most nutrients needed by trees³.

Leaf litter provides much of the minerals absorbed by forest trees. But it usually has been removed around shade trees and has often been replaced with turf grass, which has its own need for nutrients. Turf grass competes with the tree, and additional nutrients are needed to keep both healthy.

Micronutrient Problems

Microelement availability can also be altered by modifications of the soil environment. Common abnormalities involve iron, zinc, manganese, boron and copper.

Alkaline soils naturally or artificially high in calcium often make iron unavailable to the roots of many tree species. Iron is involved in chlorophyll synthesis. Plants that do not receive enough of this element have leaves that appear yellow-green or yellow. This "lime-induced" chlorosis can cause the decline and death of susceptible trees if left untreated. Complete but temporary recovery can usually be achieved by injecting iron into the tree trunk.

Laundry waste water from borax detergents that is accidentally flushed around trees or used for irrigation in arid climates can cause boron toxicity. Flushing with fresh water can correct the problem if it is diagnosed early. On the other hand, large areas in New York and New England have boron-deficient soils. Adding a little borax improves tree health.

Copper sulfate-treated burlap can cause copper toxicity to roots of balled and burlapped nursery stock. Runoff from copper leaders and drainpipes can cause a similar problem on foundation shrubs. After removing the copper source, one should apply fertilizer with a high phosphate content and water regularly. This should induce normal root growth and restore vigor.

Nutrient abnormalities, like most plant problems, are best treated early, but they are often difficult to diagnose correctly in the field. Soil and plant tissue analyses are the best aids to early diagnosis and correction of nutrient stresses. Soil testing is usually available at state universities, at little or no charge.

A soil test before planting is a step that should be included in any instructions for correct tree planting. It could help prevent the needless loss of a newly-planted tree.

Treating Soil Stress

Physical soil stress is usually treated by modifying the soil structure and texture. Nutrient stress is usually treated by adding or removing nutrients or by altering the soil pH.

Organic matter, such as peat moss, or topsoil is often added to disturbed soils to improve soil structure. Inorganic particulates, such as perlite and vermiculite, are often added to lighten soil texture.

Existing soil is loosened and aerated by hand with a crowbar or soil needle, and amendments are worked into the upper twelve inches of soil. Power equipment, such as a rotary tiller, can be used for soil improvement when the work is done prior to planting where no trees are growing.

A soil can also be improved by covering the surface with a layer of organic mulch at least six inches thick. This simulates the soil in a forest, where fallen leaves are allowed to remain and decompose on the surface.

Many types of organic mulches have been used, but shredded or chipped bark seems to

be most popular. This is probably due to its abundance and its low cost. It also resists compaction, decomposes slowly and absorbs few nutrients from the soil.

Adding Nutrients

Nutrients can be supplied in several ways. Both macronutrients and micronutrients can be added to a soil by applying them to its surface or through holes around the root zone. They also can be applied directly to trees via foliar sprays or trunk injections. All are effective methods of delivering nutrients.

The soil pH can be changed in cases where high or low pH prevents root absorption of an essential nutrient. This is usually done with ground limestone or sulfur. However, many soils have a high buffering capacity, and most pH changes are only temporary.

Nutrients can also be added in organic forms to aid in their root absorption. Examples are iron citrate or chelated iron.

The most rapid entry of nutrients has been achieved with trunk injections; foliar applications have had limited success. Several trunk injection techniques are in use currently, but which is the most effective is still a subject of debate.

A major disadvantage of all injection techniques is that trunk wounds are required for application. Therefore, a decision to inject nutrients should be based on the health importance of the abnormality and the feasibility of noninvasive techniques.

Literature Cited

1. Tate, R. L. 1980. "Detection, Description and Treatment of Girdling Roots on Urban Norway Maple Trees." *J. Arboriculture* 6:168.
2. Hudler, G. Personal communication.
3. Wilson, C. L. 1977. "Emerging Tree Diseases in Urban Ecosystems." *J. Arboriculture* 3:69-71. ❧

Update on Lime

Sooner or later most gardeners in the eastern United States, and many in wetter parts of the West, too, add ground limestone to the soil. Lime decreases the soil acidity that is natural in high-rainfall areas and "unlocks" major and minor nutrients, making them available to plants for good growth. For many years the optimum pH range for mineral soils has been considered 6.5 to 6.8 (7 being neutral, above 7 alkaline).

Until recently the assumption was that the same acidity level applied to soilless mixes, which are the prime sort for container growing today. Not so, says Professor John C. Peterson of Ohio State University (Columbus), whose experiments show that 5.2-5.5 on the pH scale is best for a soilless medium. Availability of phosphorus, an element which is important for root growth and flowering, increased more than ten times as the pH was lowered from 6.5 to 5.2. Professor Peterson used a commercial mix containing sphagnum peat, perlite, vermiculite, granite sand and composted pine bark, adding major nutrients and trace elements.

One doesn't have to hold the lime, though. Tests at Ohio Agricultural Research and Development Center, Wooster, show that Japanese beetle larvae become fewer in number after ground limestone is spread on the lawn. In one test, on a heavily thatched area with very low pH, one hundred pounds of dolomitic lime was applied to 1,000 square feet of land. Result: little grub damage, while surrounding areas were badly infested by the larvae. If a lawn needs dethatching, this aeration technique should be done before the lime application, lest the lime "barrier" be broken.

Finally, let there be a word of moderation when it is time to spread ashes from the wood stove. They have appreciable amounts of potash and calcium and some phosphorus, which is fine. They also contain some heavy metals, which is not so fine. But, in particular, wood ashes can also increase the soil pH level. University of Rhode Island (Kingston) soil scientists suggest spreading the ashes at no more than twenty pounds for 1,000 square feet per year. This would equal about six pounds of ground limestone, which could raise the pH about one point. ❧

RECENT BOOKS WORTH NOTING

IN THE LIBRARY OF THE BROOKLYN BOTANIC GARDEN

(Please order directly from your bookstore, not from the Botanic Garden.)

ENCYCLOPEDIA

Huxley's Encyclopedia of Gardening for Great Britain and America by Anthony Huxley. Universe Books, New York. \$17.50

Brief definitions of gardening practices and terms by a prominent English horticulturist. Not his best.

Exotica, International Series 4 by Alfred Byrd Graf. Roehrs Company Publishers, East Rutherford, New Jersey. Two volumes, \$175

The long-awaited successor to *Exotica 3*, the bible of indoor plant growers. The new volume, actually two, is expanded and should be useful for many years.

North American Horticulture, A Reference Guide by the American Horticultural Society. Charles Scribner's Sons, New York. \$50

Particularly helpful for addresses of plant societies, public gardens, scholarly organizations and the like. Unfortunately the price of this 367-page volume puts it beyond the reach of many home gardeners.

Popular Encyclopedia of Plants, edited by V.H. Heywood and S.R. Chant. Cambridge University Press, New York. \$29.95
Excellent general introduction to a number of subjects, mostly in dictionary form, with brief articles on larger plant groups.

10,000 Garden Questions Answered by Twenty Experts, edited by Marjorie J. Dietz. Doubleday & Company, New York. \$16.95

Update of a popular old guide edited originally by F.F. Rockwell.

HERBS

Ancient Herbs by Jeanne D'Andrea. J. Paul Getty Museum, 17985 Pacific Coast Hwy., Malibu, California 90265. Paperback, \$10 plus \$1.50 postage
Twenty-one herbs popular in Greece and

Rome, and well known to us today, are discussed, along with their historical and mythological associations. The sidelights about *garum* (the A-1 Sauce of the ancients, based on fermented fish and slathered on everything) and baked dormice add spice. Enjoyable reading.

The Fanatic's Ecstatic Aromatic Guide to Onions, Garlic, Shallots and Leeks by Marilyn Singer. Prentice-Hall, Englewood Cliffs, New Jersey. \$9.95
Lore and recipes.

Geraniums for the Iroquois, A Field Guide to American Indian Medicinal Plants by Daniel E. Moerman. Reference Publications, Algonac, Michigan. Paperback, \$8.95



CORIANDER

Leonhard Fuchsius, *De Historia Stirpium*,
Basle, 1542

Many well-known native plants were used medicinally by the Indians, including pussy willow (natural aspirin) and prickly-ash (for toothaches). Some actually helped, others were worse than the malady. A well-researched account by a University of Michigan anthropologist.

Green Pharmacy: A History of Herbal Medicine by Barbara Griggs. Viking Press, New York. \$14.95

Another carefully prepared study, and pleasant bedside reading, too.

The Scented Garden by Rosemary Verey. Van Nostrand Reinhold, New York. \$24.95

Fragrance is often overlooked in the garden but it provides another dimension if properly employed. The author is an active English horticulturist. Attractive color drawings.

VNR Color Dictionary of Herbs and Herbalism, edited by Malcolm Stuart. Van Nostrand Reinhold, New York. Paperback \$12.95

A broad-scope view from England with entries on the common culinary and medicinal sorts, but also lesser-known mild-climate trees and shrubs.

HISTORY

Fantastic Garlands by Lys de Bray. Distributed by Sterling Publishing Co., New York. \$24.95

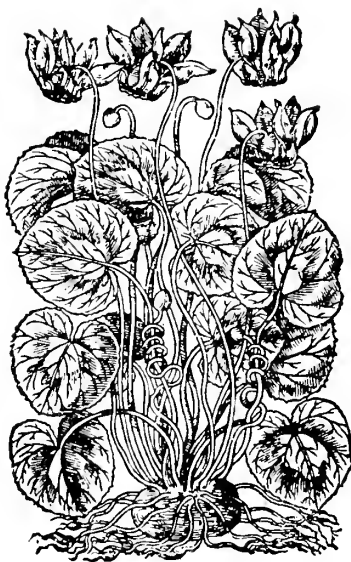
An anthology of flowers from Shakespeare with brief text and superb color drawings by the author.

The Garden of Eden, The Botanic Garden and the Re-Creation of Paradise by John Prest. Yale University Press, New Haven. \$25

How the early botanic gardens at Padua, Leyden and Oxford evolved through the quest for Paradise. Soars.

Gardens of a Golden Afternoon by Jane Brown. Van Nostrand, Reinhold, New York. \$29.95

The remarkable association of English architect Edward Luytens and garden designer Gertrude Jekyll is explored in this scholarly but readable account that sheds light on the gardens of the early twentieth century. Because of the transitory nature of nonwoody plants few of her gardens remain as they



CYCLAMEN

(Common name, sowbread) John Girard, *The Herball, or General Historie of Plants*, London, 1597

were, but a number of ideas now taken for granted about the design of informal borders came from Miss Jekyll, who was affectionately known as Aunt Bumps.

The King's Garden by Marguerite Duval. University of Virginia Press, Charlottesville. \$14.95

Translation of a French study on plant exploration. Most such books originate in England, stressing the role of that country, and it is interesting to have a different view as represented here.

The Lore and Legends of Flowers by Robert L. Crowell, illustrated by Anne Ophelia Dowden. Thomas Y. Crowell, New York. \$14.50

Delightful brief stories of particular plants. As always, the color paintings by Mrs. Dowden, one of America's leading floral artists, are a joy.

The Men Who Made Central Park by M.M. Graff. Greensward Foundation, New York. Paperback, \$1.50 (by mail, \$2.50 from Friends of Central Park, Mrs. M. Solomon, 530 E. 88th St., New York, NY 10028)

Pithy, refreshing, occasionally caustic view of Olmsted and Vaux.



LARGE-FLOWERED ST. JOHN'S WORT

INDOOR PLANTS, GREENHOUSES

Home Solar Gardening by John H. Pierce.
Van Nostrand Reinhold, New York. Hard
cover \$14.95, paperback \$8.95

In addition to the solar greenhouse this discusses solar rooms, sunpits, frames, even cloches. Timely and helpful.

Indoor Plants by Brian and Valerie Proudley.
Distributed by Sterling Publishing Co.,
New York. \$14.95

Attractive small guide to the better known sorts. The color photographs are superior. From England.

Scientific Greenhouse Gardening by Peter Kincaid Willmott. Sterling Publishing Co.,
New York. \$17.95

Types of small houses, and their heating, ventilating and irrigation are discussed in this British import. Growing techniques and special plant groups, including fruits, vegetables, chrysanthemums and spring bulbs.

LANDSCAPE DESIGN

The Complete Book of Edible Landscaping
by Rosalind Creasy. Sierra Club Books,
San Francisco. \$25

One way to control bamboo is to eat it. There is a rebirth of interest in food plants around the home property, and this book goes into more detail than most.

Nature's Design by Carol A. Smyser. Rodale Press, Emmaus, Pennsylvania. \$21.95

An unusually detailed, practical introduction to "natural" landscaping. There are sections on site analysis, landscape plans and plant selection, construction and maintenance.

Natural Landscaping by John Dieckmann and Robert Schuster. McGraw Hill, New York. \$24.95

Two landscape architects discuss native plant communities and the planning of landscapes based on them. The average reader will probably want to turn to the Smyser book first.

Theme Gardens by Barbara Damrosch.
Workman Publishing Co., New York.

Hard cover \$19.95, paperback \$10.95

Sixteen special kinds of gardens are described, including Victorian, Shakespearean, a child's garden and one for old roses. Planning them, plants to use. Refreshing, well illustrated.

MISCELLANEOUS

Gardening, A Gardener's Dictionary by Henry Beard and Roy McKie. Workman Publishing Co., New York. Paperback \$4.95

Wonderfully humorous definitions. For example, a *perennial*—any plant which, had it lived, would have bloomed year after year. Or, *garden*—one of a vast number of free outdoor restaurants operated by charity-minded amateurs in an effort to provide healthful, balanced meals for insects, birds and animals.

Guide to Fruits and Vegetables. Rodale Press,
Emmaus, Pennsylvania. \$19.95

Surprisingly good treatment on care and varieties. Strongest when describing and comparing varieties of particular crops.

Penjing, The Chinese Art of Miniature Gardens by Hu Yunhua. Timber Press,
Beaverton, Oregon. \$39.95

Chinese bonsai has been overshadowed by Japanese for a long time though it is its precursor. This will be of particular appeal to those interested in origins.

MUSHROOMS

A Field Guide to Mushrooms and Their Relatives by Booth Courtenay and Harold H. Burdsall, Jr. Van Nostrand Reinhold, New York. \$18.95

The inclusion of the coral mushrooms and other kin provide a novel, broader scope for identification. Color plates.

VNR Color Dictionary of Mushrooms, edited
by Colin Dickenson and John Lucas. Van



PRIMROSE

Thomas Johnson, *The Herball, etc.*, of Girard, enlarged and amended, London, 1633

Nostrand Reinhold, New York. Soft cover \$12.95

Attractive and useful volume. Good introduction.

PLANT GROUPS

Agaves of Continental North America by Howard Scott Gentry. University of Arizona Press, Tucson. \$49.50

A thorough treatment mainly for the specialist.

Combined Rose List 1982 by Beverly R. Dobson. Available from the author, 215 Harriman Rd., Irvington, New York 10533. Paperback \$3.50

A buyer's guide.

The Complete Guide to Water Plants by Helmut Muhlberg. Sterling Publishing Co. \$12.95

"Complete" is misleading if not obnoxious in book titles, but this solid, rather scientific, tome from Germany explores the subject in greater depth than most. Useful to the intent pond gardener or avid aquarium curator with taxonomic bent.

The Iris Book by Brian Mathew. Universe Books, New York. \$40

American gardeners, alas, think mainly in terms of bearded and Siberian iris, of which

there are countless cultivars, but this book explores the more-than-200 species found in the wild. All are beautiful, some are exquisite. Written by a Kew botanist, this concise volume will be the standard reference for years to come. Some color plates.

Look to the Rose by Sam McGredy, paintings by Joyce Blake. Charles Scribner's Sons, New York. \$24.95

A leading New Zealand nurseryman writes about particular cultivars with knowledge, warmth and style.

Rhododendrons and Azaleas by Mervyn Kessell. Distributed by Sterling Publishing Co., New York. \$17.50

An introduction from England with greater emphasis on culture and propagation than on cultivars.

REGIONAL

Flowering Plants in the Landscape, edited by Mildred E. Mathias. University of California Press, Berkeley. \$16.95

Exceptionally useful for warm-climate gardeners, with plenty of color photographs. The author is a respected California botanist.

Gardening with Native Plants of the Pacific Northwest by Arthur R. Kruckeberg. University of Washington Press, Seattle. \$24.95

Welcome addition to a growing series of regional books, by a professor at the University of Washington.

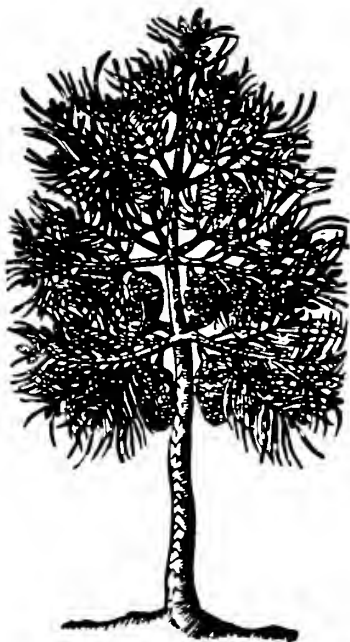
SCIENTIFIC

Biological Control of Weeds With Plant Pathogens, edited by Raghavan Charudatlan and H. Lynn Walker. John Wiley and Sons, New York. \$42.50

Comparative Flora of Staten Island 1879-1981 by Richard Buegler and Steven Parisio. Staten Island Institute of Arts and Sciences, New York. \$4.96

The Gypsy Moth: Research Toward Integrated Pest Management, edited by Charles C. Doane and Michael L. McManus. U.S. Department of Agriculture, Washington, D.C. \$29

The Manual of Cultivated Orchid Species by Helmut Bechtel, Phillip Cribb and Ed-



STONE PINE

Thomas Johnson, *The Herball, etc.*, of Girard, enlarged and amended, London, 1633

mund Launert. MIT Press, Cambridge, Massachusetts. \$75.

Tropical Tree Crops by Lawrence K. Apeke. John Wiley and Sons, New York. \$38.95

Weed Science: Principles and Practices, second edition, by Glenn C. Klingman and Floyd M. Ashton. John Wiley and Sons, New York. \$24.50

TRAVEL

The Chelsea Flower Show by Faith and Geoff Whiten. Hamish Hamilton, North Pomfret, Vermont. \$22.50

A history that will delight anyone familiar with that great English rite of spring.

The Great Public Gardens of the Eastern United States by Doris M. Stone. Pantheon Books, New York. Paperback \$12.95

Some thirty-four gardens are described in detail, with opening hours, historical background and other information of use to the visitor. The author is in charge of the Education Department at BBG.

Kew, edited by F. Nigel Hepper. Stemmer House, Owings Mills, Maryland. \$24.95
England's premier botanic garden is described at some length by its staff. Collections, research programs and history. Wakehurst Place, an outreach garden, is also included. Well illustrated.

TREES AND SHRUBS

Climbers and Wall Plants by Peter Q. Rose.

Sterling Publishing Co., New York. \$17.95
Vines play a much greater role in gardens of England, and this slim but meaty volume from that country serves as a good introduction to the major sorts there. Brief sections on uses and culture precede a descriptive list.

Evergreens, A Guide for Landscape, Lawn and Garden by H. Peter Loewer. Walker and Company, New York. \$14.95

Broadleaf sorts such as box, holly and rhododendron are included in this introduction, as are conifers. Excellent line drawings.

The Hillier Colour Dictionary of Trees and Shrubs. David and Charles, North Pomfret, Vermont. \$19.95

Contains only a fraction of the plants cited in *Hilliers' Manual*, a standard reference, but this spin-off volume will have broader appeal because of color plates. Concise, at times telegraphic, descriptions.

Ornamental Shrubs by C.E. Lucas Phillips and Peter N. Barber. Van Nostrand Reinhold, New York. \$29.95

Descriptions of sorts popular in England, with thirty-two attractive color plates.

URBAN GARDENING

Your Garden in the City by Jack Kramer. Crown Publishers, New York. \$19.95

Much of the information is applicable to small gardens in the country, too. Not an in-depth treatment.

A Handbook of Community Gardening by Boston Urban Gardeners, edited by Susan Naimank. Charles Scribner's Sons, New York. \$14.95

Suggestions on how to go about it. How to organize, how to cope with the numerous problems that can arise. The emphasis is on vegetables, of course. 🌱

From Francis Bacon
(1561-1626), *Of Gardens*.
Art Nouveau decoration by
James Hall.



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C. Total paid circulation (Sum of 10B1 and 10B2)	13,476*	12,522**
D. Free distribution by mail, carrier or other means (samples, complimentary, and other free copies)	260*	272**
E. Total distribution (Sum of C and D)	13,736*	12,794**
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Eva Melady

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he plants it for posterity.**

—Alexander Smith

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